
Importance-Satisfaction Ratings Five-year Comparison,
SPA & ER Use, and Socioeconomic and Ecological Monitoring
Comparison of Results 1995-96 to 2000-01

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Table of Contents

Foreword	ii
List of Figures	iv
List of Tables	v
List of Appendix Figures	vi
List of Appendix Tables	vii
I. Introduction	1
II. Importance-Satisfaction: Comparisons 1995-96 versus 2000-01	2
Importance Satisfaction Analysis	2
Resident and Visitor Samples	4
All Residents and Visitors	4
Experienced vs. Non-Experienced Users	5
Visitors	6
Residents	8
III. SPA & ER Use	10
IV. Comparative Profiles: SPA & ER Users versus Non Users, 2000-01	11
Socioeconomic Profiles	12
SPA & ER User Values	16
Importance and Satisfaction Ratings	18
V. Opinions on “No Take Areas”	20
VI. Linking Ecological Monitoring Results with Socioeconomic Results	25
Diversity: Overall FKNMS 1995-96 to 2000-01	25
Abundance: Overall FKNMS 1995-96 to 2000-01	26
Amount of Living Coral: Overall FKNMS 1995-96 to 2000-01	28
Water Clarity (High Visibility): Overall FKNMS 1995-96 to 2000-01	29
Diversity: No Take vs. Open (Reference) Areas	30
Abundance: No Take vs. Open (Reference) Areas	31
Amount of Living Coral: No Take vs. Open (Reference) Areas	33
Water Clarity (High Visibility): No Take vs. Open (Reference) Areas	34
VII. Interpretation and Conclusions	35
References	40
Appendix A: Importance-Satisfaction 2000-01	42
Appendix B: SPA & ER User Profiles	46
Appendix C: SPA & ER User Importance/Satisfaction Ratings	58

Foreword

This report is part of the Recreation and Tourism component of the Socioeconomic Research and Monitoring Program for the Florida Keys National Marine Sanctuary (FKNMS). The Socioeconomic Research and Monitoring Program was designed in a workshop held in Islamorada, Florida in January 1998, which was attended by 50 social scientists and community stakeholders. Baseline measurements for Recreation and Tourism were obtained in a 1995-96 study entitled "Linking the Economy and Environment of the Florida Keys/Florida Bay." At the 1998 workshop, participants recommended that the Importance-Satisfaction Ratings on 25 natural resource attributes, facilities and services obtained in the 1995-96 study be replicated every three to five years.

We were not able to replicate the Importance-Satisfaction ratings for all residents and visitors of Monroe County as was done in 1995-96, instead we were able to take advantage of a multiple agency partnership to conduct the "Socioeconomic Study of Reefs in Southeast Florida, 2000-2001". This was a study of the artificial and natural reefs off Palm Beach, Broward, Miami-Dade and Monroe Counties. Through the Socioeconomic Research and Monitoring Program for the FKNMS, we were able to add-on several extra modules of questions to address issues in the FKNMS. The scope was limited to residents and visitors that engaged in boating activities and used either an artificial or natural reef. We were able to go back to the 1995-96 baseline databases and select those residents and visitors that engaged in boating activities so we could make five-year comparisons of mean importance and satisfaction scores. Future plans call for a more complete replication of the 1995-96 study. This is tentatively planned for 2005-06.

We were also able to add a section to the 2000-01 survey on the use of Sanctuary Preservation Areas (SPAs) and Ecological Reserves (ERs) or "no take zones". This report includes baseline estimates of use of the SPAs and ERs and we are able to produce comparative socioeconomic profiles of SPA & ER Users versus Non Users, comparative importance and satisfaction scores, and estimates of economic user value.

In our baseline year of 1995-96, the Sanctuary Preservation Areas (SPAs) and Ecological Reserves (ERs) or "no take zones" were not yet in existence. Twenty-two of the SPAs and ERs (18 of which are open to nonconsumptive recreation activities) went into effect on July 1, 1997. The Tortugas Ecological Reserve went into effect on July 1, 2001. The Socioeconomic Study of Reefs in Southeast Florida was for the time period of June 2000 through May 2001. Therefore, the Tortugas Ecological Reserve was not part of the 2000-01 survey results.

Finally, we were able to compare a selected set of measurements from the socioeconomic and ecological monitoring programs. We were able to do this for the overall trends across the entire FKNMS for the period 1995-96 to 2000-01, and for comparisons of the SPAs and ERs with the open or reference areas. The attributes we were able to compare included water clarity, diversity of fish and sea life, abundance of fish, and amount of living coral on the reefs.

In the last section of the report, we provide interpretation and conclusions. Our interpretations and conclusions are based on a conceptual model of linking the economy and environment presented in Leeworthy and Bowker (1997). The model

shows how to interpret actual and perceived conditions of natural resource attributes, facilities and services with respect to market and nonmarket economic values. Our results show that for most of the 25 natural resource attributes, facilities and services there have been significant declines in mean satisfaction scores for both residents and visitors of Monroe County. In some cases, ecological and socioeconomic monitoring is not in agreement. In the former case, there is a clear need to invest in understanding and solving problems and in the latter case a need to provide education and outreach efforts to correct misperceptions. In both cases, the objective is to avoid negative economic outcomes.

For more information on the Socioeconomic Research and Monitoring Program for the Florida Keys National Marine Sanctuary, go to our web site at:

<http://marineeconomics.noaa.gov/SocmonFK/keys.html>

For baseline studies on Recreation and Tourism, "Linking the Economy and Environment of the Florida Keys/Florida Bay" go to our web site at:

<http://marineeconomics.noaa.gov/SocmonFK/Linking.html>

For the Monroe County (FKNMS) results from the "Socioeconomic Study of Reefs in Southeast Florida, 2000-2001", go to our web site at:

<http://marineeconomics.noaa.gov/Reefs/sefl1.html>

All the reports on our web site are in downloadable portable document format (pdf) and can be downloaded using Adobe Acrobat Reader.

For the report, "Proposed Tortugas 2000 Ecological Reserve, Final Socioeconomic Impact Analysis of Alternatives", go to our web site at:

<http://marineeconomics.noaa.gov/reserves/Tortugas.pdf>

For those who prefer paper copies of reports, call, fax, e-mail or write us and we will send via U.S. Post Office.

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List of Figures

Figure	
1.	Importance/Satisfaction Matrix 3
2.	Importance/Satisfaction Matrices 1995-96 and 2000-01: Visitor Surveys 7
3.	Importance/Satisfaction Matrices 1995-96 and 2000-01: Resident Surveys 9
4.	Age: Comparison of Resident SPA & ER Users with Non Users 13
5.	Age: Comparison of Visiting SPA & ER Users with Non Users 14
6.	Party Size: Comparison of Visiting SPA & ER Users with Non Users 15
7.	Artificial Reef Use: Comparison of Resident SPA & ER Users with Non Users 15
8.	Natural Reef Use: Comparison of Visiting SPA & ER Users with Non Users 16
9.	Monroe County Residents Support for “no take” zones in Florida Keys: Comparison of SPA & ER Users with Non Users 21
10.	Monroe County Residents Support for “no take” zones in Palm Beach, Broward, and Miami-Dade Counties: Comparison of SPA & ER Users with Non Users 22
11.	Monroe County Residents Support for Additional “no take” zones in Monroe County (FKNMS) 23
12.	Monroe County Residents Preference for percentage of Southeast Florida Reef protection through “no take” zones 24
13.	Conceptual Model Linking the Economy and Environment 37

List of Tables

Table

1. Comparisons of Importance-Satisfaction Scores: 1995-96 and 2000-01 Boating Samples	5
2. Comparisons of Importance-Satisfaction Scores based on Experience: 2000-01 Sample	5
3. Areas of Concern: Trends in Attributes, Visitor Survey	7
4. Areas of Concern: Trends in Attributes, Resident Survey	9
5. Snorkeling and Scuba Diving Person-Days on Reefs: 2000-01	10
6. SPA & ER Use in FKNMS: 2000-01	11
7. SPA & ER Use Value: 2000-01	18
8. Comparison of 2000-01 Importance/Satisfaction Scores: SPA & ER Users versus Non SPA & ER Users	19
9. Reef User Perceptions vs. Ecological Observations: Overall FKNMS	30
10. Reef User Perceptions vs. Ecological Observations: Comparison of SPAs & ERs to Open (Reference) Areas	35

List of Appendix Figures

Figure

A1.	Importance/Satisfaction Matrix Code Descriptions, Graph of Means, and Descriptive Statistics: Visitor Survey 1995-96	42
A2.	Importance/Satisfaction Matrix Code Descriptions, Graph of Means, and Descriptive Statistics: Visitor Survey 2000-01	43
A3.	Importance/Satisfaction Matrix Code Descriptions, Graph of Means, and Descriptive Statistics: Resident Survey 1995-96	44
A4.	Importance/Satisfaction Matrix Code Descriptions, Graph of Means, and Descriptive Statistics: Resident Survey 2000-01	45
B1.	Visitor Profile: Primary Purpose of Trip, SPA & ER Users vs. Non Users	46
B2.	Visitor Profile: Income Comparison, SPA & ER Users vs. Non Users	46
B3.	Visitor Profile: Race Breakdown, SPA & ER Users vs. Non Users	47
B4.	Visitor Profile: Distribution by Sex, SPA & ER Users vs. Non Users	47
B5.	Visitor Profile: Diving/Fishing Club Membership, SPA & ER Users vs. Non Users	48
B6.	Visitor Profile: Artificial Reef Usage, SPA & ER Users vs. Non Users	48
B7.	Visitor Profile: Both Artificial and Natural Reef Usage, SPA & ER Users vs. Non Users	49
B8.	Visitor Profile: Boat Ownership, SPA & ER Users vs. Non Users	49
B9.	Visitor Profile: Seasonal Distribution, SPA & ER Users vs. Non Users	50
B10.	Monroe County Resident Profile: Income Comparison, SPA & ER Users vs. Non Users	53
B11.	Monroe County Resident Profile: Race Breakdown, SPA & ER Users vs. Non Users	53
B12.	Monroe County Resident Profile: Education Attainment, SPA & ER Users vs. Non Users	54
B13.	Monroe County Resident Profile: Diving/Fishing Club Membership, SPA & ER Users vs. Non Users	54
B14.	Monroe County Resident Profile: Natural Reef Usage, SPA & ER Users vs. Non Users	55
B15.	Monroe County Resident Profile: Distribution by Sex, SPA & ER Users vs. Non Users	55
B16.	Monroe County Resident Profile: Party Size, SPA & ER Users vs. Non Users	56
C1.	Comparison of 2000-01 SPA & ER Users versus Non-SPA & ER Users: Mean Scores for Importance and Satisfaction	58

List of Appendix Tables

Table	
B1. Visitor Profile: Experience (Years Boating in South Florida)	50
B2. Visitor Profile: Number of Times Visiting Monroe County over last 12 months	50
B3. Visitor Profile: Number of Days Visiting Monroe County over last 12 months	50
B4. Visitor Profile: Number of Overnight Trips to Monroe County last 12 months	51
B5. Visitor Profile: Number of Nights Stayed in Monroe County – Current Trip	51
B6. Visitor Profile: Number of Trips on Reefs over last 12 months	51
B7. Visitor Profile: Percent of SPA & ER Users and Non Users by State of Residence	52
B8. Visitor Profile: Percent of SPA & ER Users and Non Users by Country of Residence	52
B9. Monroe County Resident Profile: Boat Size (Square Feet)	56
B10. Monroe County Resident Profile: Experience (Years Boating in South FL)	56
B11. Monroe County Resident Profile: Number of Trips to Nat-Art Reefs	57
B12. Monroe County Resident Profile: Number of Trips to Natural Reefs over last 12 months	57
B13. Monroe County Resident Profile: Number of Trips to Artificial Reefs over last 12 months	57

I. Introduction

This report addresses several issues in the Recreation and Tourism component of the Socioeconomic Research and Monitoring Program for the Florida Keys National Marine Sanctuary (FKNMS). First, is a five-year replication of importance and satisfaction ratings for 25 natural resource attributes, facilities, and services. Baseline measurements were obtained in a 1995-96 study entitled “Linking the Economy and Environment of Florida Keys/Florida Bay”. The 2000-01 ratings were obtained as part of the “Socioeconomic Study of Reefs in Southeast Florida, 2000-2001.” We provide comparisons of mean importance and satisfaction scores for the 1995-96 and 2000-01 samples of residents and visitors of Monroe County (FKNMS).

Second, we obtained measurements of use of the Sanctuary Preservation Areas (SPAs) and Ecological Reserves (ERs) or “no take zones” from the 2000-01 reef study. The SPAs and ERs did not exist in 1995-96. Twenty-two SPAs (18 of which allow nonconsumptive recreation) and one ER went into effect July 1, 1997. The Tortugas Ecological Reserve did not go into effect until July 1, 2001. The 2000-01 reef study covered the period from June 2000 through May 2001, therefore results presented here on SPAs and ERs do not include the Tortugas Ecological Reserve. The Tortugas Ecological Reserve receives very light use. For estimates and spatial patterns of use in the Tortugas Ecological Reserve, see Leeworthy and Wiley (2000).

Third, from the 2000-01 reef study we were able to produce comparative socioeconomic profiles of reef users between SPA & ER Users versus Non Users. We were also able to conduct comparative analyses between SPA & ER Users and Non Users on their importance and satisfaction ratings and their economic use values for the artificial and natural reefs, and estimate the economic user value for the SPAs and ERs.

Fourth, we were able to make comparisons of ecological and socioeconomic monitoring results for the time period 1995-96 to 2000-01. We were able to do this for four selected natural resource attributes; diversity of fish and sea life, abundance of fish, amount of living coral on the reefs, and water clarity

In the final section of the report, we provide interpretations and conclusions of socioeconomic and ecological monitoring results using a conceptual model linking the economy and environment of the FKNMS. Our conclusions are that even though there are significant declines in both actual and perceived conditions, the lags or time delays between when people perceive these declines and actual changes in their behaviors, present opportunities to make the necessary investments to correct problems and/or undertake education and outreach efforts to correct misperceptions. In both cases, the objective is to avoid the model’s prediction of negative economic outcomes.

II. Importance-Satisfaction Ratings: Comparison 1995-96 vs. 2000-01

Importance-Satisfaction Analysis. The ratings presented here were given by residents and visitors on the importance of, and satisfaction derived from 25 natural resource attributes, facilities and services. For presentation, a technique called “importance-performance” or “importance-satisfaction” is used. This technique is a simple but useful way in which to summarize and provide an interpretation of resident and visitor ratings.

For many years, the U.S. Forest Service and many other federal, state, and local agencies that manage parks and/or other natural resources have used the National Satisfaction Index (NSI) for measuring visitor satisfaction. Satisfaction is a complex feature of the recreation/tourist experience and it is now agreed upon by most researchers that “Importance-Performance” or “Importance-Satisfaction” is a much more complete measure and provides a much simpler interpretation than the NSI. First described in the marketing literature by Martilla and James (1977), it has been described and/or used in such studies as Guadagnolo (1985), Richardson (1987), Hollenhorst, Olson, and Fortney (1992), Leeworthy and Wiley (1996) and Leeworthy and Wiley (1997).

The satisfaction questionnaire was divided into two sections to obtain the necessary information for the importance-satisfaction analysis. The first section asks the respondent to read each statement and rate the importance of each of the 25 items as it contributes to an ideal recreation/tourist setting for the activities in which they participated in the Florida Keys National Marine Sanctuary. Each item is rated or scored on a one to five scale (1-5) with one (1) meaning “Not Important” and five (5) meaning “Extremely Important.” The respondent was also given the choices of answering “Not Applicable” or “Don’t Know.” The second section asks the respondent to consider the same list of items they just rated for importance and to rate them for how satisfied they were with each item at the places they did their activities in the Florida Keys National Marine Sanctuary. Again, a five-point scale was used with one (1) meaning “Terrible” and a score of five (5) meaning “Delighted.” Respondents were also given the choices of answering either “Not Applicable” or “Don’t Know.”

In this report, the analyses are presented in several ways. First, the means or average scores are reported along with the estimated standard errors of the mean, the sample sizes (number of responses), and the percent of respondents that gave a rating. This latter measure is important because many respondents provide importance ratings for selected items but may not have had a chance to use a resource, facility, or service and therefore do not provide a satisfaction rating. This might lead to biases in comparing importance and satisfaction. However, in recent applications, we have found that the analysis is robust with respect to this problem, i.e., it has no significant impact on the conclusions (see Leeworthy and Wiley 1996).

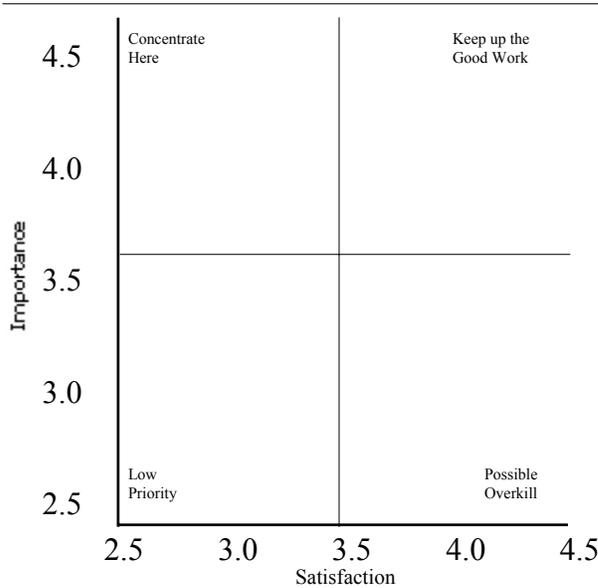
The second method of presentation is the bar charts showing the mean scores for each item for importance and satisfaction. It is important to note that, while both importance and satisfaction are measured on a one to five scale, the scales have different meanings and are not really directly comparable. They do, however, communicate relative

importance/satisfaction relationships across the different items. But some find this harder to work with than the simpler analytical framework provided next.

The most useful analytical framework provided in importance-satisfaction analysis is the four-quadrant presentation. The four quadrants are formed by first placing the importance measurement on the vertical axis and the satisfaction measurement on the horizontal axis (see Figure 1). An additional vertical line is placed at the mean score for all 25 items on the satisfaction scale and an additional horizontal line is placed at the mean score for all 25 items on the importance scale. These two lines form a cross hair. The cross hair then separates the importance-satisfaction measurement area into four separate areas or quadrants. This allows for interpretation as to the “relative importance” and “relative satisfaction” of each item. That is, if everyone gave high scores to all items in the Florida Keys National Marine Sanctuary, we would still be able to judge the relative importance and satisfaction and establish priorities.

The use of the four quadrants provides a simple but easy-to-interpret summary of results.

Figure 1. Importance/Satisfaction Matrix



Scores falling in the upper left quadrant are relatively high on the importance scale and relatively low on the satisfaction scale. This quadrant is labeled “**Concentrate Here.**” Scores falling in the upper right quadrant are relatively high on the importance scale and also relatively high on the satisfaction scale and are labeled “**Keep up the Good Work.**” Scores falling in the lower left quadrant are relatively low on both the importance and satisfaction scale and are labeled “**Low Priority.**” And, finally, scores in the lower right quadrant are relatively low on the importance scale but relatively high on the satisfaction scale and are labeled “**Possible Overkill.**”

In general, the 25 items that residents and visitors were asked to rate are organized into four categories. In the survey, the order of the items was mixed. Each of the items is given a letter rather than a number and so are labeled A through Y. Items A through G are labeled “**Natural Resources.**” These seven items are either natural resources or attributes of natural resources such as clear water. Items H through M are labeled “**Natural Resource Facilities.**” These six items are either facilities that provide access to natural resources or areas or features that provide public access to natural resources. Items N through V are labeled “**Other Facilities.**” These nine items are either facilities or features of facilities that are not directly related to natural resources but are indirectly

related since they represent items associated with the general infrastructure of the area. Items W through Y are labeled “**Services.**” These three items are either services or features of a service provided to residents and visitors. We considered separate analyses for each group but rejected this approach in favor of establishing the relative importance of each item with respect to all items. The organization into four categories was done simply as an aid to those users that have responsibilities in separate areas.

Resident and Visitor Samples. The 2000-01 reef study only included those that engaged in boating activities and used the artificial or natural reefs in southeast Florida. To make comparisons with 1995-96 samples of residents and visitors of Monroe County (FKNMS), we had to go back to the 1995-96 study databases and select out the sub-samples of residents and visitors that engaged in boating activities. These samples form the basis of our comparisons.

Another important issue to note is that the same samples of the resident and visitor populations are not being surveyed in each iteration of the survey. In other words the respondents to the 1995-96 survey are not the same respondents to the 2000-01 survey. The implications of this include the potential for other factors, besides changes in the condition of the attributes, explaining the changes in ratings between time periods. These include changes in the demographic makeup and varying preferences of the 2000-01 sample not being the same as the 1995-96 sample. We account for this by also segmenting our samples by level of experience. Experienced users are defined as those with five or more years of experience.

All Residents and Visitors. Both visitors and residents had significantly lower satisfaction scores for the attribute B. “Amount of Living Coral on Reefs.” Thus, users seem to perceive the decline in coral cover noted by scientists in the ecological monitoring results (See Table 1). These perceptions are likely to translate into future declines in user values and demand resulting in losses in both market and non-market economic values for coral reefs. Combined with significant declines in satisfaction scores for 24 of 25 items by both visitor and resident users, we predict a future decline in both market and nonmarket values for use and visitation to the Florida Keys, if corrective actions are not taken (See Interpretations and Conclusions section at the end of this report).

Table 1. Comparisons of Importance-Satisfaction Scores: 1995-1996 and 2000-2001 Boating Samples

	Trend from 95-96 Sample, Boating Sample ²							
	Visitors				Residents			
	Importance		Satisfaction		Importance		Satisfaction	
	Trend	Significance ¹	Trend	Significance ¹	Trend	Significance ¹	Trend	Significance ¹
I. Shoreline access	4.8%	**	-10.8%	**	-15.4%	**	-12.2%	**
H. Parks and specially protected areas	6.9%	**	-9.4%	**	-10.1%	**	-11.8%	**
J. Designated swimming/beach areas	8.8%	**	-9.6%	**	-13.4%	**	-14.6%	**
K. Mooring buoys near coral reefs	6.5%	**	-11.3%	**	-2.3%	**	-15.5%	**
D. Many different kinds of fish and sea life to catch	8.5%	**	-9.5%	**	7.5%	**	-11.3%	**
U. Cleanliness of streets and sidewalks	4.0%	**	-9.2%	**	-12.6%	**	-5.9%	**
B. Amount of living coral on reefs	8.3%	**	-10.4%	**	-2.6%	**	-14.2%	**
V. Uncrowded conditions	7.4%	**	-13.8%	**	0.8%	**	-13.9%	**
N. Historic preservation	7.3%	**	-8.7%	**	-13.0%	**	-13.4%	**
W. Maps, brochures, and other tourist info	7.1%	**	-8.9%	**	-16.8%	**	-14.3%	**
E. Opportunity to view large wildlife	10.1%	**	-12.5%	**	0.4%	**	-7.1%	**
L. Marina facilities	6.4%	*	-10.1%	**	-10.5%	**	-14.8%	**
F. Large Numbers of Fish	10.7%	**	-9.5%	**	-2.2%	**	-13.3%	**
O. Parking	7.3%	**	-11.8%	**	-30.3%	**	-8.5%	**
R. Condition of bike paths and sidewalks/paths	3.7%	**	-11.8%	**	-16.0%	**	-7.1%	**
G. Quality of beaches	5.7%	**	-11.5%	**	-5.4%	**	-16.6%	**
M. Boat ramps/launching facilities	1.6%	**	-13.3%	**	-15.8%	**	-13.3%	**
T. Availability of public restrooms	4.7%	**	-6.3%	**	-12.1%	**	-12.6%	**
S. Condition of roads and streets	2.4%	**	-10.0%	**	-19.4%	**	-6.1%	**
X. Service and friendliness of people	2.2%	**	-6.5%	**	-9.0%	**	-9.7%	**
Q. Directional signs, street signs, mile markers	3.4%	**	-10.7%	**	-23.3%	**	-12.7%	**
P. Public transportation	12.4%	**	-8.6%	**	-20.6%	**	0.1%	**
Y. Value for the price	4.8%	**	-11.5%	**	-8.1%	**	-7.2%	**
C. Many different kinds of fish and sea life to view	9.6%	**	-10.0%	**	-1.8%	**	-10.2%	**
A. Clear Water (high visibility)	7.5%	**	-2.6%	**	-2.6%	**	-13.0%	**

1. Based on t-test. ** denotes significance at 5% level, * denotes significance at the 10% level.

2. Includes only those who participated in boating activities from the 95-96 sample.

Experienced vs. Non Experienced Users. What about more experienced visitors and residents (those with at least five years of experience versus those with less than five years experience)? The same overall result is evident, although the decline is not as pronounced as initially hypothesized. The authors hypothesized that more experienced users would have significantly lower satisfaction scores than less experienced users for items where quality is declining. For visitors, this hypothesis was supported for 18 of 25 attributes, while for residents it was supported for only three of 25 attributes (See Table 2). For residents, only one of the three items with a significant decline in satisfaction scores was a natural resource attribute (Clear Water – high visibility).

Table 2. Comparisons of Importance-Satisfaction Scores based on Experience: 2000-2001 Sample

	2000-2001 Sample Comparison Based on Experience ²							
	Visitors				Residents			
	Importance		Satisfaction		Importance		Satisfaction	
	Comparison	Significance ¹	Comparison	Significance ¹	Comparison	Significance ¹	Comparison	Significance ¹
I. Shoreline access	0.9%		-11.0%	**	-12.8%	**	-5.6%	
H. Parks and specially protected areas	-1.8%		-12.7%	**	-7.0%		-5.3%	
J. Designated swimming/beach areas	-4.3%		-5.8%		-4.3%		-1.1%	
K. Mooring buoys near coral reefs	9.0%	*	-14.9%	**	-5.7%		-4.2%	
D. Many different kinds of fish and sea life to catch	24.3%	**	-12.1%	**	-3.5%		-4.9%	
U. Cleanliness of streets and sidewalks	-1.6%		-10.6%	**	-0.3%		6.6%	
B. Amount of living coral on reefs	4.4%		-10.8%	**	-0.2%		-2.4%	
V. Uncrowded conditions	-0.7%		-11.8%	**	0.3%		-10.3%	*
N. Historic preservation	-0.4%		-5.3%		-0.5%		-7.4%	
W. Maps, brochures, and other tourist info	-6.3%		-10.2%	**	1.0%		-9.1%	
E. Opportunity to view large wildlife	0.1%		-11.2%	**	-7.7%	**	7.7%	
L. Marina facilities	12.4%	*	1.6%		-3.6%		-8.2%	
F. Large Numbers of Fish	9.5%	**	-12.9%	**	-5.9%	*	-7.8%	
O. Parking	-3.8%		-11.3%	**	-16.4%	*	0.0%	
R. Condition of bike paths and sidewalks/paths	-2.3%		-10.8%	**	-2.9%		1.8%	
G. Quality of beaches	-4.7%		-6.3%		-1.7%		-6.3%	
M. Boat ramps/launching facilities	24.9%	**	4.1%		-3.0%		-11.8%	*
T. Availability of public restrooms	-6.3%	*	-9.3%	**	-7.8%		3.0%	
S. Condition of roads and streets	-1.3%		-13.7%	**	-6.5%		3.2%	
X. Service and friendliness of people	-4.8%	*	-10.4%	**	4.7%		-0.9%	
Q. Directional signs, street signs, mile markers	-2.9%		-5.5%		-16.6%	**	-6.0%	
P. Public transportation	-12.2%		-11.7%	*	-11.4%		-2.2%	
Y. Value for the price	0.6%		-9.2%	*	-4.4%		1.8%	
C. Many different kinds of fish and sea life to view	2.6%		-9.4%	**	-4.0%		-3.9%	
A. Clear Water (high visibility)	0.6%		-6.1%		-6.1%	**	-13.1%	**

1. Based on t-test. ** denotes significance at 5% level, * denotes significance at the 10% level.

2. Analysis is a comparison between those with less than five years to those with greater than, or equal to five years experience.

A "+" denotes a higher score with higher experience and a "-" denotes a lower score with higher experience.

Visitors. There were 275 respondents in the 2000-01 visitors survey and 917 respondents in the 1995-96 visitors survey, who had usable importance-satisfaction responses. In none of the cases did 100 percent of all respondents give ratings for any one item. Figure 2 summarizes the importance-satisfaction results for the 2000-01 visitors sample (see Appendix A, Figure A.1. for detailed results for the 1995-96 visitor sample); the last column reports the percent of respondents that provided a rating on the item. Generally, a lower percent of respondents provide satisfaction ratings for a given item than provide importance ratings.

In Figure 2, each attribute is plotted on a series of graphs. The first graph shows the attributes of the 1995-96 boating sample plotted. The reason for the inclusion of these scores is, as mentioned above, the 2000-01 survey only included boaters. Therefore, this is the starting point to estimate the trend toward the 2000-01 sample. The middle graph is the 2000-01 scores plotted against the crosshairs of the 1995-96 boater sample mean scores. With this graph, the trend in scores is illustrated by showing the relative placement of 2000-01 scores to 1995-96 sample means. The graph shown on the right contains the 2000-01 scores plotted against the crosshairs of the 2000-01 sample. This is a static matrix and is used to gauge the relative perceptions of visitors in the 2000-01 sample.

As can be seen in the graphs and in Table 3, there has been a marked decline in satisfaction scores, while at the same time an increase in overall importance scores, between the 1995-96 and 2000-01 survey periods. In the 1995-96 survey (boating sample), there were seven attributes located in the “concentrate here” quadrant. In the 2000-01 survey, these same seven attributes remained in this quadrant and were joined by nine additional attributes.

Additionally, five attributes moved from the “possible overkill” quadrant to the “low priority” quadrant, and two attributes were in the “low priority” quadrant in both survey periods. Finally, two attributes, A and X, were in the “keep up the good work” quadrant for both survey periods.

Although it is important to examine the trends in attribute scores over time, it is equally valuable to consider the scores in one period in time. In this way, the relative scoring of what is more or less important during the

Key Findings

Visitors

- 2000-01 boating visitors had significantly higher importance score than the 1995-96 sample for 20 out of 25 attributes.
- 2000-2001 boating visitors had significantly lower satisfaction scores than 1995-96 boating visitors for 24 out of 25 attributes.
- More experienced visitors have higher importance scores than less experienced visitors for 5 out of 25 attributes, and lower scores for 2 out of 25 attributes.
- More experienced visitors have lower satisfaction scores than less experienced visitors for 18 of 25 attributes.
- In the static 2000-01 analysis, seven attributes fell into the “concentrate here” category.

Residents

- 2000-01 boating residents had significantly lower importance score than the 1995-96 sample for 19 out of 25 attributes and a significantly higher importance score for one attribute.
- 2000-01 boating residents had significantly lower satisfaction scores than 1995-96 boating visitors for 24 out of 25 attributes.
- More experienced residents have lower importance scores than less experienced residents for 6 out of 25 attributes.
- More experienced residents have lower satisfaction scores than less experienced residents for three of 25 attributes.
- In the static 2000-01 analysis, six attributes fell into the “concentrate here” category.

survey period can be ascertained. Looking at the data in this way, it was found that ten attributes fell in the “keep up the good work” category, three attributes fell in the “possible overkill” category, and five attributes fell into the “low priority” category. Additionally, seven attributes fell into the “concentrate here” category. They are, C. Many different kinds of fish and sea life to view, G. Quality of beaches, I. Shoreline access, J. Designated swimming/beach areas, T. Availability of public restrooms, V. Uncrowded conditions, and Y. Value for the price.

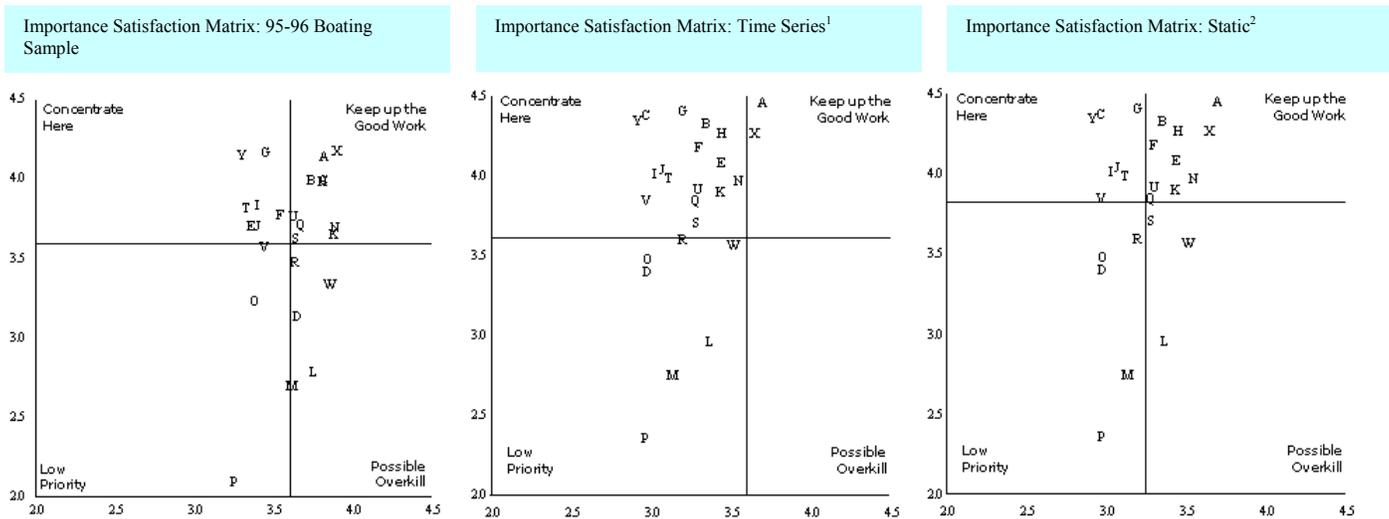


Figure 2. Importance-Satisfaction Matrices 1995-96 and 2000-01: Visitor Surveys

1. This matrix shows the 2000-01 attributes plotted on the matrix, however the mean score crosshairs are from the 1995-96 boating sample. The attributes of the 1995-96 boating sample are shown in the graph to the left. In this way the trend of each attribute is illustrated.
2. This matrix simply shows the 2000-01 attributes plotted with the 2000-01 mean score lines.

Table 3. Areas of Concern: Trends in Attributes Visitor Survey

Concentrate Here		
1995-1996	2000-2001 ¹	
E	B	K
F	C	N
G	E	Q
I	F	S
J	G	T
T	H	U
Y	I	V ²
	J	Y

1. Attributes in red moved from "Keep up the Good Work" to "Concentrate Here" in 2000-2001

2. This attribute moved from “Low Priority” to “Concentrate Here”

Residents. There were 609 respondents in the 2000-01 resident survey and 455 respondents in the 1995-96 resident survey, who had usable importance-satisfaction responses. In none of the cases did 100 percent of all respondents give ratings for any one item (see Appendix A, Figure A.3 for detailed results for the 1995-96 resident sample and Figure A.4 for detailed results for the 2000-01 resident sample). Generally, a lower percent of respondents provide satisfaction ratings for a given item than provide importance ratings.

In Figure 3, each attribute is plotted on a series of graphs. The first graph shows the attributes of the 1995-96 boating sample plotted. The reason for the inclusion of these scores is, as mentioned above, the 2000-01 survey only included boaters. Therefore, this is the starting point to estimate the trend toward the 2000-01 sample. The middle graph is the 2000-01 scores plotted against the crosshairs of the 1995-96 boater sample mean scores. With this graph, the trend in scores is illustrated by showing the relative placement of 2000-01 scores to 1995-96 sample means. The graph shown on the right contains the 2000-01 scores plotted against the crosshairs of the 2000-01 sample. This is a static matrix and is used to gauge the relative perceptions of residents in the 2000-01 sample.

As can be seen in the graphs and in Table 4, there has been a significant decline in satisfaction scores, while at the same time a decline in overall importance scores, between the 1995-96 and 2000-01 survey periods. In the 1995-96 survey (boating sample), there were nine attributes located in the “concentrate here” quadrant. In the 2000-01 survey, there were ten attributes in the “concentrate here” quadrant, five of which were in this quadrant in the 1995-96 survey, four of which moved from the “keep up the good work” category and one attribute from the “possible overkill” category. Additionally, four attributes moved from the “concentrate here” quadrant to the “low priority” quadrant, four attributes moved from the “possible overkill” quadrant to the “low priority” quadrant and five attributes were in the “low priority” quadrant in both survey periods. It is important to note that there are no 2000-01 attributes to the right of 1995-96 vertical mean satisfaction line in the middle graph, meaning there was no improvement in relative satisfaction ratings for any item.

Although it is important to examine the trends in attribute scores over time, it is equally valuable to consider the scores in one period in time. In this way, the relative scoring of what is more or less important during the survey period can be ascertained. Looking at the data in this way, it was found that eight attributes fell in the “keep up the good work” category, four attributes fell in the “possible overkill” category, and seven attributes fell into the “low priority” category. Additionally, six attributes fell into the “concentrate here” category - these include B. Amount of living coral on reefs, F. Large numbers of fish, G. Quality of beaches, U. Cleanliness of streets and sidewalks, V. Uncrowded conditions, and Y. Value for the price.

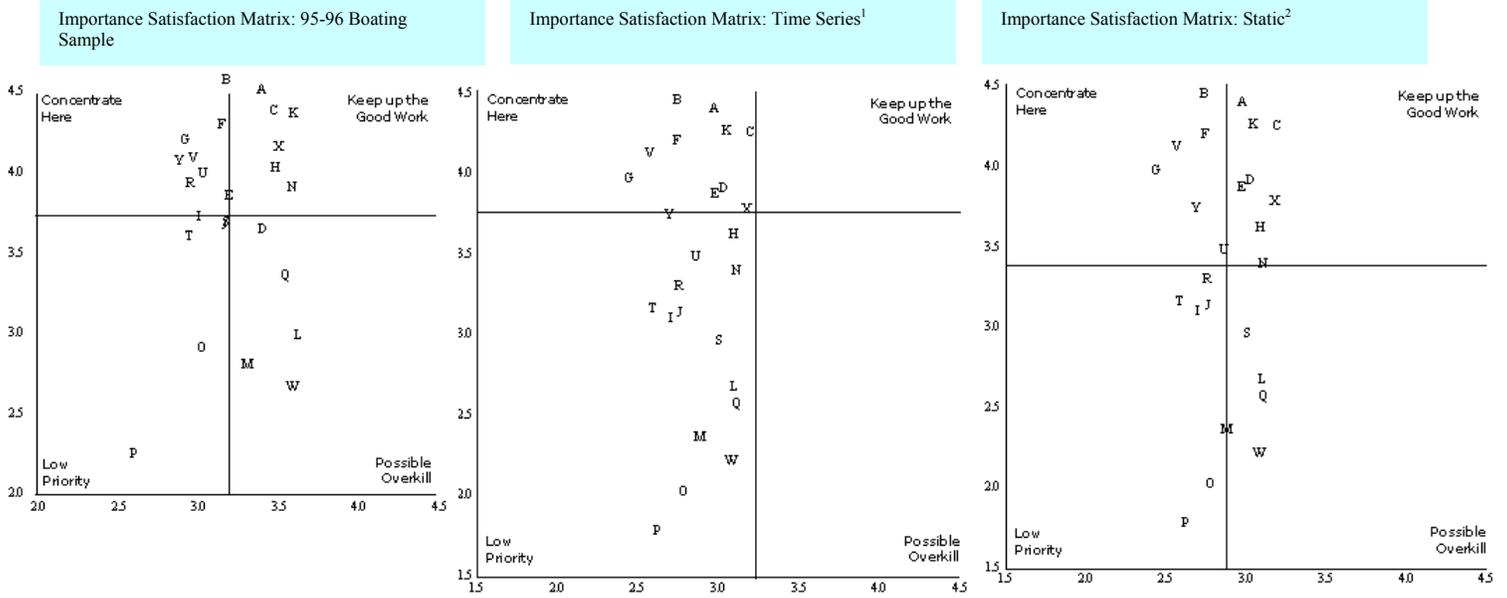


Figure 3. Importance-Satisfaction Matrices 1995-96 and 2000-01: Resident Surveys

1. This matrix shows the 2000-2001 attributes plotted on the matrix, however the mean score crosshairs are from the 1995-1996 boating sample. The plotted attributes of the 1995-1996 boating sample are shown in the graph to the left. In this way the trend of each attribute is illustrated.
2. This matrix simply shows the 2000-2001 attributes plotted with the 2000-2001 mean score lines.

Table 4. Areas of Concern: Trends in Attributes Resident Survey

Concentrate Here			
1995-1996		2000-2001 ¹	
B	R	A	F
E	U	B	G
F	V	C	K
G	Y	D²	V
I		E	X
			Y

1. Attributes in red moved from "Keep up the Good Work" to "Concentrate Here" in 2000-2001
2. Moved from "Possible Overkill" to "Concentrate Here"

III. SPA & ER Use

The 2000-01 Reef Study was the first time both residents and visitors were surveyed about their use of the FKNMS Sanctuary Preservation Areas (SPAs) and Ecological Reserves (ERs). The SPAs and ERs, with only a few exceptions, like netting bait, are “no take areas”.

In 2000-01, 57.8% of resident reef users used the SPAs and/or ERs versus 44.3% of all visitor reef users. For visitors, a fairly high proportion (16.5%) didn’t know if they used a SPA or ER.

In the 2000-01 Reef Study, three types of use were measured in the SPAs and ERs; 1) snorkeling, 2) scuba diving, and 3) glass-bottom boat rides. Glass-bottom boat rides measured were limited to visitors. All three activities were measured in terms of person-days of use, where a person-day includes a whole day or any part of a day. Numbers of dives were also measured for snorkeling and scuba diving. Here, person-days are reported to relate SPA and ER use to total reef use for both residents and visitors (Table 5).

Sanctuary Preservation Areas are marine zones that focus on the protection of shallow, heavily used reefs where conflicts occur between user groups, and where concentrated visitor activity leads to resource degradation. These areas are designed to enhance the reproductive capabilities of renewable resources, protect areas critical for sustaining and protecting important marine species, and reduce user conflicts in high-use areas. This is accomplished through the prohibition of consumptive activities within these areas. SPAs are chosen based on the status of important habitat, the ability of a particular area to sustain and protect the habitat, the level of visitor use, and the degree of conflict between consumptive and nonconsumptive users. The actual size and location of these zones have been determined by examination of user patterns, aerial photography, and ground-truthing of specific habitats.

Ecological Reserves are designed to encompass large, contiguous diverse habitats. They are intended to provide natural spawning, nursery, and permanent residence areas for the replenishment and genetic protection of marine life and to protect and preserve all habitats and species particularly those not protected by fishery management regulations. These reserves are intended to protect areas that represent the full range of diversity of resources and habitats found throughout the Sanctuary. The intent is to meet these objectives by limiting consumptive activities, while continuing to allow activities that are compatible with resource protection. This will provide the opportunity for these areas to evolve in a natural state, with a minimum of human influence. These zones will protect a limited number of areas that provide important habitat for sustaining natural resources such as fish and invertebrates.

Source: National Marine Sanctuary Program

Table 5. Snorkeling and Scuba Diving Person-Days on Reefs: 2000-01

<u>Type of User</u>	<u>All Reefs</u>	<u>Person-Days by Reef Type</u>		
		<u>Artificial Reefs</u>	<u>Natural Reefs</u>	<u>No Reefs</u>
Residents	1,634,745	578,606	1,056,139	N/A
Visitors	1,120,964	197,410	923,554	40,001
Total	2,755,709	776,016	1,979,693	N/A

Source: Johns, et al (2003).

In 2000-01, over 1.24 million person-days were spent in the SPAs and ERs (Table 6). This represented 45% of all reef use (natural and artificial) in the FKNMS, and 62.8% of all natural reef use in the FKNMS.

Visitors accounted for over 649 thousand person-days of activity in the SPAs and ERs (52.25% of all person-days in the SPAs and ERs), while residents accounted for over 593 thousand person-days of activity in the SPAs and ERs (Table 6).

There were almost 1.2 million person-days of snorkeling and scuba diving in the SPAs and ERs and 58.5 thousand glass-bottom boat rides. Resident and visitor snorkeling and scuba diving person-days were almost equal, with residents spending an estimated 593 thousand person-days versus the visitors with 590 thousand person-days (Table 6).

Table 6. SPA & ER Use in FKNMS: 2000-01

	Person-Days		Total	% of Total
	<u>Snorkeling and Scuba Diving</u>	<u>Glass-bottom Boat Rides</u>		
Residents	593,400	N/A	593,400	47.75
Visitors	590,700	58,500	649,200	52.25
Total	1,184,100	58,500	1,242,600	100.00

Although 57.8% of residents used a SPA or ER, they spent 36.3% of their total snorkeling and scuba diving person-days in the FKNMS inside the SPAs and ERs. Only 44.3% of visitors used a SPA or ER, but 50.9% of their snorkeling and scuba diving took place in the SPAs and ERs, and 72.7% of visitor glass-bottom boat rides were in the SPAs and ERs.

If we restrict our view to natural reef use, residents spent 56.2% of their snorkeling and scuba diving person-days on natural reefs inside the SPAs and ERs. Visitors spent 64% of all their snorkeling and scuba diving person-days on natural reefs inside the SPAs and ERs. Visitors also spent 82% of their glass-bottom boat rides on natural reefs inside the SPAs and ERs.

IV. Comparative Profiles: SPA & ER Users vs. Non Users, 2000-01

In the 2000-01 Reef Study, we obtained socioeconomic profiles of users including such variables as age, sex, race/ethnicity, education level, household income, membership in fishing or diving clubs, years of experience boating in South Florida, use of artificial or natural reefs, and party size. These variables were obtained for both resident and visitor samples.

For residents (all were boating residents that used artificial or natural reefs), we also obtained boat size. For visitors, we identified whether they owned their boat. Many visitors use charter/party boats or guide services.

For both residents and visitors, we estimated their user values for artificial reef use, natural reef use, and their willingness to pay for new artificial reefs. For detailed results of resident and visitor reef users in general, see Johns, et. al (2003). Here we will present differences between SPA & ER users and Non-SPA & ER users.

We also replicated the 1995-96 Importance/Satisfaction ratings for residents and visitors. The SPAs and ERs didn't exist in 1995-96, so all we can present here is the static 2000-01 differences in ratings between SPA & ER users versus Non-SPA & ER users.

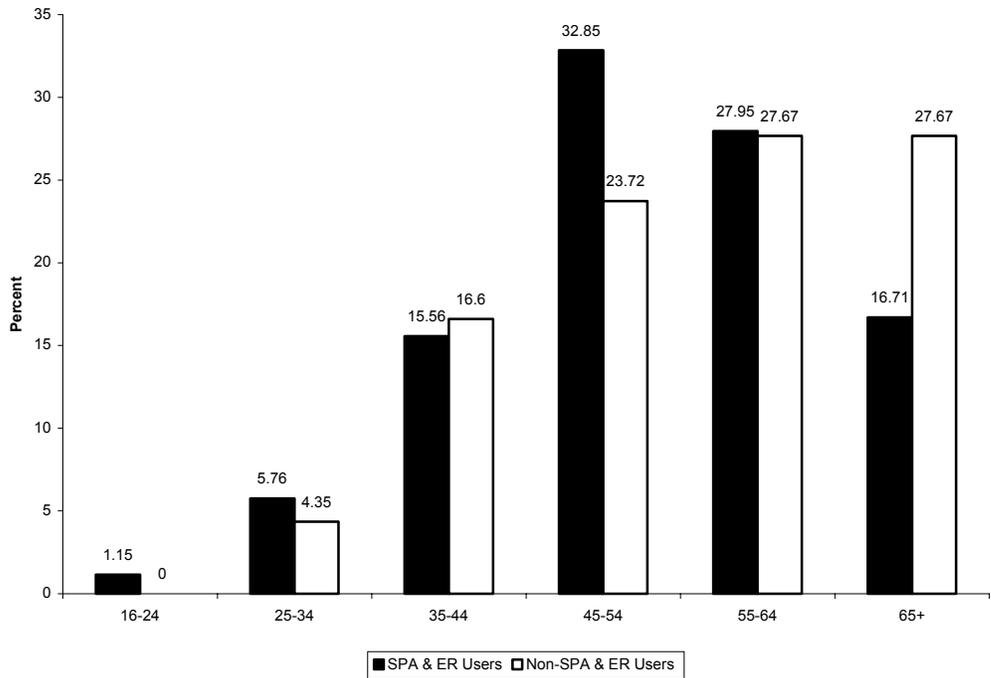
Finally, we gathered the opinions of Monroe County residents on the “no take areas” currently in the FKNMS; their opinions about possible new “no take areas” in the waters off the three counties to the north (e.g. Miami-Dade, Broward, and Palm Beach); their opinions about additional “no take areas” in the FKNMS (Monroe County); and what percent of the coral reefs should be protected through the use of “no take areas”.

When comparing SPA & ER users to Non-SPA & ER users, we use statistical tests. We only present a graphic (bar chart) if the differences for a specific variable are statistically significant. Full results are presented in the appendices of this report. For discrete variables or categorical variables, we use a nonparametric test for differences in the distribution (Kolmogorov-Smirnov-two-sample test). For continuous variables, like age or experience, we apply a t-test for differences in means, and the Kolmogorov-Smirnov-two-sample-test for differences in the empirical distribution (whether the bar charts are showing significant differences). We use the 0.05 level of significance as the cut-off point (i.e., 95 percent confidence level).

Socioeconomic Profiles. Generally, there were few differences between SPA & ER users and Non-SPA & ER users. Significant differences were found for age, party size and type of reef use.

Age. For both residents and visitors, SPA & ER users were, on average, younger than Non-SPA & ER users (Figures 4 & 5).

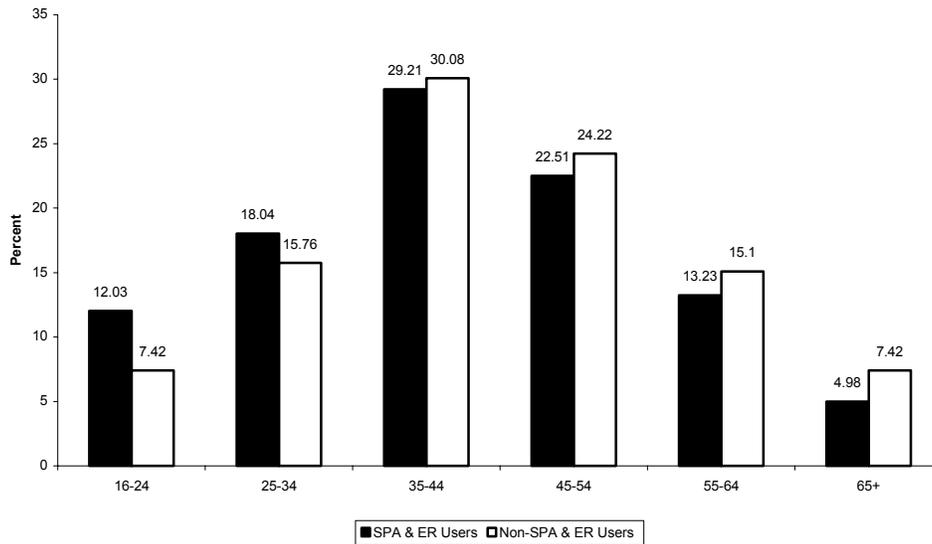
**SPA & ER users from Monroe County are younger than
Non-SPA & ER users from Monroe County**



	<u>SPA & ER users</u>	<u>Non-SPA & ER users</u>
Minimum	17	12
Maximum	81	85
Mean	52.67	55.67
Median	53.00	57
Mode	46	57

Figure 4. Age: Comparison of Resident SPA & ER Users with Non Users

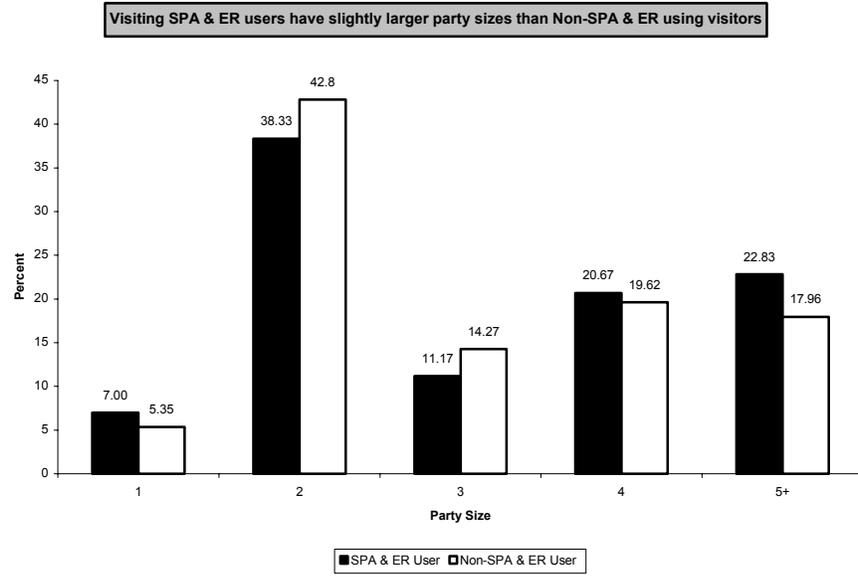
Visiting SPA & ER users are younger than Non-SPA & ER using visitors



	SPA & ER users	Non-SPA & ER users
Minimum	16	16
Maximum	77	83
Mean	41.50	44.48
Median	41.00	43.50
Mode	42.00	40.00

Figure 5. Age: Comparison of Visiting SPA & ER Users with Non Users

Party Size. Visitor SPA & ER users had slightly larger party sizes than Non-SPA & ER using visitors (Figure 6). For residents there were no differences in party size between SPA & ER users and Non-SPA & ER users.



	SPA & ER users	Non-SPA & ER users
Minimum	1	1
Maximum	48	40
Mean	4.26	3.51
Median	3.00	3.00
Mode	2.00	2.00

Figure 6. Party Size: Comparison of Visiting SPA & ER Users with Non Users

Type of Reef Use. Resident SPA & ER Users had a higher likelihood of using artificial reefs than Non-SPA & ER using residents (Figure 7). For visitors, SPA & ER users had a higher likelihood of using natural reefs than Non-SPA & ER using visitors (Figure 8).

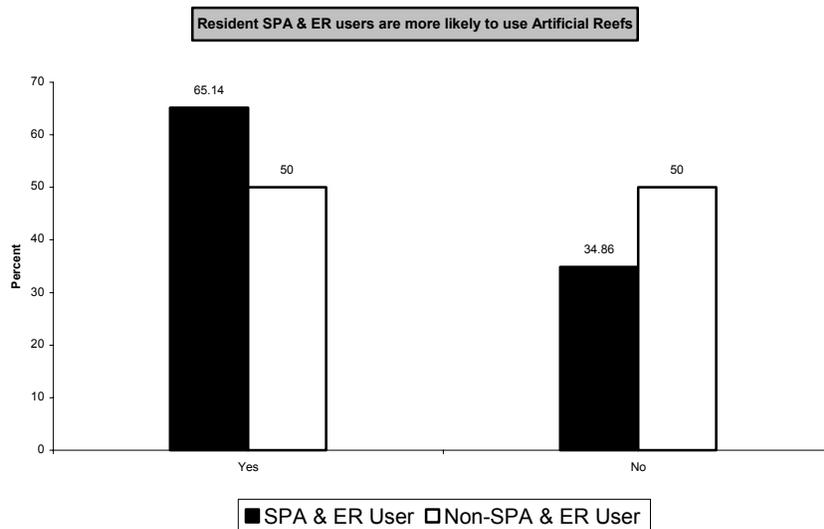


Figure 7. Artificial Reef Use: Comparison of Resident SPA & ER Users with Non Users

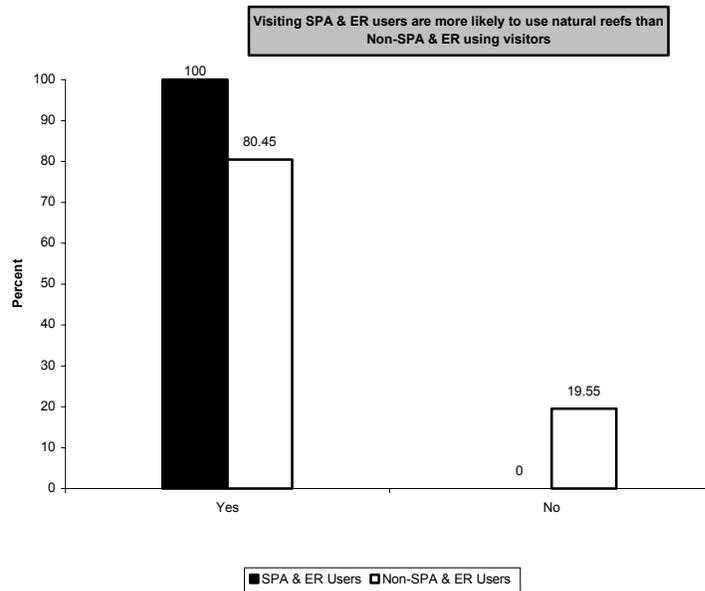


Figure 8. Natural Reef Use: Comparison of Visiting SPA & ER Users with Non Users

For the rest of the socioeconomic variables there were no significant differences. The full results of the profiles are included in Appendix B.

SPA & ER User Values. Economic user values (consumer’s surplus – value over and above what users pay for reef use, stated another way, economic user values are equal to people’s total willingness to pay for reef use minus what they actually have to pay for reef use. This is a net value or surplus.) were estimated for each visitor and resident in the 2000-01 samples (See Johns et al, 2003). Here results are compared between SPA & ER Users and Non Users.

Visitors. Visitor SPA & ER users had significantly higher economic user values for artificial reefs, natural reefs, and for all reefs (natural and artificial reefs) than Non-SPA & ER using visitors, when measured on a per party per trip basis. However, because visitor SPA & ER users had significantly larger party sizes than non SPA & ER users, there was no difference in economic user values when normalized on a per person-trip or per person-day basis.

Using a weighted average of user value per person-day for snorkeling and scuba diving from Johns et al (2003) for natural reef use and multiplying by the number of person-days of diving by visitors in the SPAs & ERs yields an estimated total annual user value of diving in the SPAs & ERs of about \$11.5 million. Following the same procedure for glass-bottom boat rides yields an annual user value of \$1.3 million. So visitors have a total annual user value of SPAs & ERS of about \$12.8 million (Table 7).

Residents. There were no statistically significant differences between resident SPA & ER users and Non-SPA & ER using residents.

Using a weighted average of user value per person-day for snorkeling and scuba diving from Johns et al (2003) for natural reef use and multiplying by the number of person-days of diving by residents in the SPAs & ERs yields an estimated total annual user value of diving in the SPAs & ERs of about \$5.5 million (Table 7).

Visitors and Residents. For all diving use by both visitors and residents, the SPAs and ERs generate almost \$17 million annually in economic user value and another \$1.3 million for glass-bottom boat rides. SPAs and ERs have a total annual user value of \$18.3 million (Table 7). Capitalizing this \$18.3 million in annual user value using a discount rate of three (3) percent and assuming this annual flow of value continues into perpetuity (indefinite future), we can derive an estimate of the asset value of the SPAs and ERs. Asset value represents what someone would be willing to pay today for the right to own the SPAs and ERs if they could charge a price for their use. The asset value is estimated to be \$610 million (\$18.3 million divided by 0.03).

Both annual user value and the asset value are likely under estimates of economic user value because the SPAs & ERs are probably not used to full capacity and future use is likely to increase. Also, it is likely that user value per unit of use (per person-day) will also increase in the future as demand for their use increases relative to the world supply of coral reefs.

In addition, **total use value is an under estimate of total economic value** because it is highly likely that some people have non use economic value or passive economic value for SPAs and ERs. Non use or passive economic use values include people's willingness to pay some amount simply to know that the SPAs and ERs will be maintained in a certain condition, even though they never intend to use the SPAs & ERs (existence value) or people's willingness to pay to ensure the SPAs & ERs are maintained for future generations to enjoy (bequeath value). Another type of non use value not accounted for here is "option value" or the amount people would be willing to pay to ensure that SPAs and ERs would be maintained in a condition suitable for their use some time in the future, even though they currently have not had a chance to use them. This latter value is like that of an insurance policy on future use, where there is uncertainty both about future use and future supply of the resource.

Table 7. SPA & ER Use Value: 2000-01

Type of User	User Value Per Person-day (\$)	Annual Person-days of Use	Annual Use Value (Millions \$)
Visitors			
Diving ¹	\$19.46	590,700	\$11.495
Glass-bottom boat rides	\$22.53	58,500	\$1.318
Total	\$19.74	649,200	\$12.813
Residents			
Diving ¹	\$9.25	593,400	\$5.489
Visitors & Residents			
Diving ¹	\$14.34	1,184,100	\$16.984
Glass-bottom boat rides	\$22.53	58,500	\$1.318
Total	\$14.73	1,242,600	\$18.302

1. Diving includes snorkeling and scuba diving.

Sources: For user values per person-day, *Johns et al, 2003*. For annual Person-days, this report Table 6.

Importance/Satisfaction Ratings. In an earlier part of this report, Importance/Satisfaction ratings were provided on 25 natural resource attributes, facilities, and services, and compared between measurements taken in 1995-96 and 2000-01 for both residents and visitors. Here we compare measurements taken in 2000-01 for both residents and visitors, and we further disaggregated these groups into SPA & ER users versus Non-SPA & ER users. We do this for only eight (8) of the 25 items that are more directly or indirectly related to SPAs & ERs. The eight items include six (6) natural resource attribute items and two (2) natural resource facility items (Table 8). For results on all 25 items see Appendix C.

Table 8. Comparison of 2000-01 Importance/Satisfaction Scores:
SPA & ER Users versus Non-SPA & ER Users

Item	Visitors		Residents	
	Importance	Satisfaction	Importance	Satisfaction
<i>Natural Resource Attributes</i>				
A. Clear Water (high visibility)	+●	+	+●	ND
B. Amount of living coral on reefs	+	+	+●	-
C. Many different kinds of fish and sea life to view	+●	+●	+●	-
D. Many different kinds of fish and sea life to catch	-●	+	-	-●
E. Opportunity to view large wildlife (manatees, whales, dolphins, sea turtles)	-	+	+●	-
F. Large number of fish	-	+●	+●	-
<i>Natural Resource Facilities</i>				
H. Parks and specially protected areas	+●	+●	+●	+
K. Mooring buoys near coral reefs	+●	+	+●	+

● = statistically significant difference in mean scores at 0.05 or lower level of significance
 + = higher mean score, not statistically significant
 - = lower mean score, not statistically significant
 +● = higher mean score and statistically significant at 0.05 or lower
 -● = lower mean score and statistically significant at 0.05 or lower
 ND= no difference

Importance Scores

Visitors. Visiting SPA & ER users had higher mean importance scores than Non-SPA & ER users for four of the eight items;

- A. Clear Water (high visibility)
- C. Many different kinds of fish and sea life to view
- H. Parks and specially protected areas
- K. Mooring buoys near coral reefs

Visiting SPA & ER users had a lower mean importance score than Non-SPA & ER users for;

- D. Many different kinds of fish and sea life to catch

This is as expected since catching fish and sea life is prohibited in the SPAs and ERs.

Residents. Resident SPA & ER users had higher mean importance scores than Non-SPA & ER users for seven of the eight items, all except

D. Many different kinds of fish and sea life to catch

Again for item (D), this is expected since catching fish and sea life is prohibited in the SPAs and ERs. The difference from the result for visitors was that mean scores for item (D) were lower for SPA & ER users than Non-SPA users, but not statistically significant.

Satisfaction Scores

Visitors. Visiting SPA & ER users had higher mean satisfaction scores than Non-SPA & ER users for three of the eight items;

- C. Many different kinds of fish and sea life to view
- F. Large numbers of fish
- H. Parks and specially protected areas

All other differences were not statistically significant.

Residents. Resident SPA & ER users had a lower mean satisfaction score than Non-SPA & ER users for only one item:

D. Many different kinds of fish and sea life to catch

All other differences were not statistically significant.

V. Opinions on the “No Take Areas”

The final section of the 2000-01 Reef Study served to gather the opinions Monroe County residents hold towards “no take areas”. The survey provided an introductory statement to the respondents explaining the nature of “no take areas”; the distinction between SPAs and ERs, how many of each currently exists, and the size encompassed by the SPAs and ERs. With this background information given, the survey then questioned resident’s opinions concerning possible expansion of the current “no take areas”.

We present the results of these responses in this section. One must keep in mind that these opinions are limited to Monroe County residents only, visitors were not asked these sets of questions because the researchers thought that they could not properly control for the effect of the “*not in my back yard*” (*NIMBY*) effect for the visitor population due to length of the survey. One should also note that there is no comparison with the 1995-96 study, as “no take areas” were not in existence in 1995-96. The resident group was disaggregated to distinguish between SPA & ER users and Non-SPA & ER users.

The first question asked Monroe County residents whether they supported the currently designated “no take zones” in the Florida Keys. For all resident reef users, an overwhelming majority supported the existing “no take zones” (78 percent). Also there was no significant difference among recreational fishermen (76 percent support the no take zones). While the majority of respondents favored the current design of “no take zones” in the FKNMS, a higher proportion of resident SPA & ER users favored the currently designated “no take zones” than Non-SPA & ER using residents (Figure 9). These differences were statistically significant.

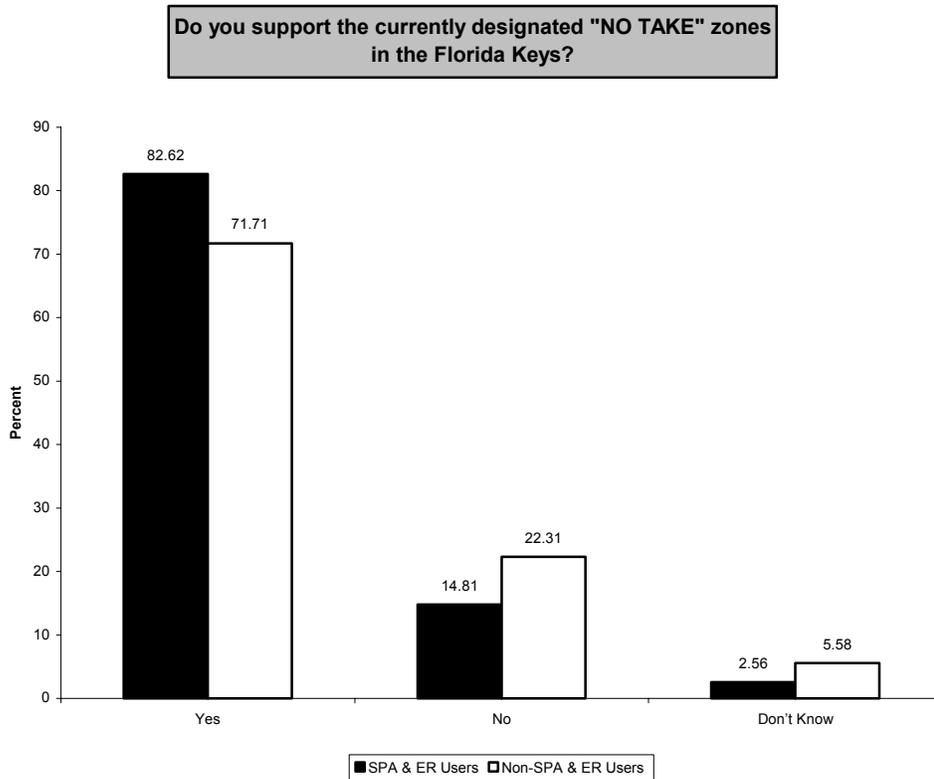


Figure 9. Monroe County Residents: Support for “No Take” zones in Florida Keys, Comparison of SPA & ER Users with Non Users

The following two questions (see Figures 10 and 11) tested the “NIMBY” (Not In My Backyard) theory by asking residents whether they supported the creation of new “no take zones” in the waters off the three counties to the north (Palm Beach, Broward, and Miami-Dade), versus whether they supported additional “no take zones” in Monroe County.

The results proved interesting in that a higher proportion of Monroe County residents supported the creation of additional “no take zones” in Monroe County, rather than the counties to the north (57 percent of all resident reef users and 55 percent of reef using recreational fishermen). This would reject the NIMBY argument; in fact, these results indicate that Monroe County residents see benefits to “no take zones” and would encourage additional protections in their county. Both SPA & ER users and Non-SPA &

ER users supported these results, with a higher proportion of SPA & ER using residents affirming than Non-SPA & ER using residents.

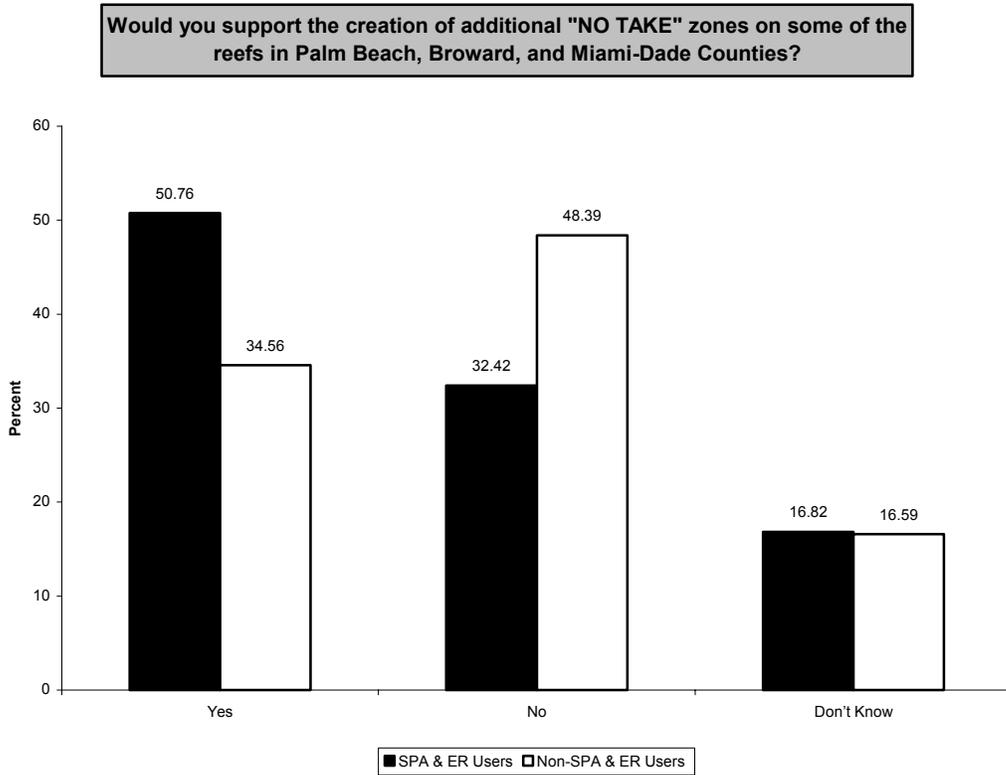


Figure 10. Monroe County Residents: Support for “No Take” zones in Palm Beach, Broward, and Miami-Dade Counties, Comparison of SPA & ER Users with Non Users

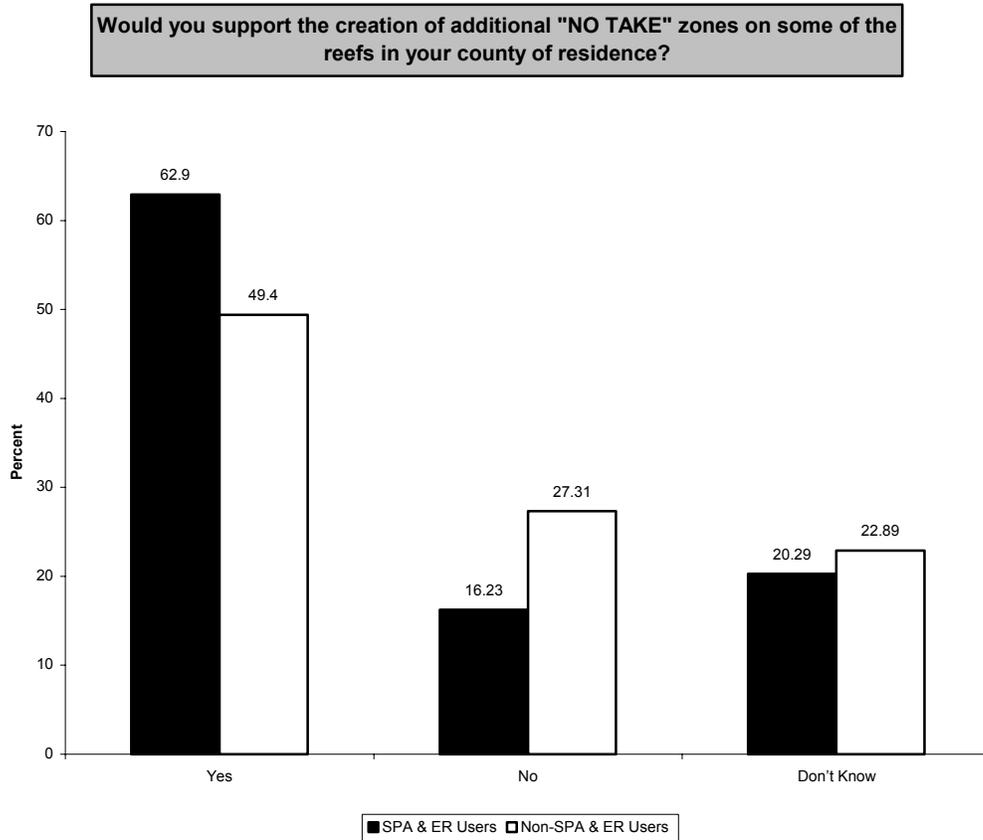


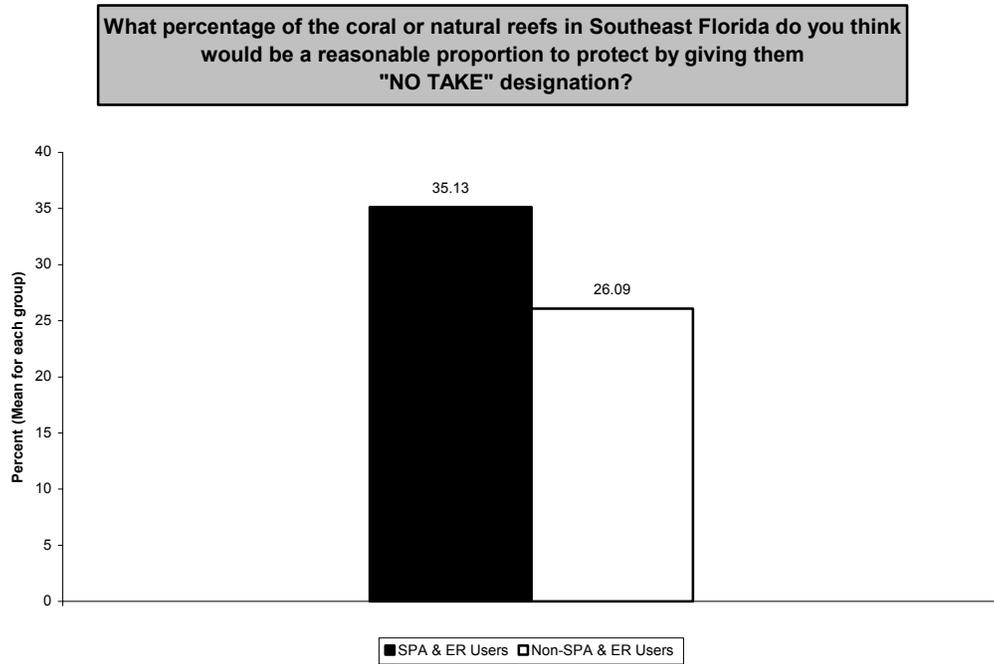
Figure 11. Monroe County Residents: Support for additional “No Take” zones in Monroe County (FKNMS)

The final question posed an open-ended response question inquiring what percentage of the coral or natural reefs in Southeast Florida did residents feel would be a reasonable proportion to protect by using “no take” designations.

The all reef using resident mean was about 32% and 27% for reef using recreational fishermen. This implies that of the survey respondents, Monroe County residents desire, on average, that 32% of the coral or natural reefs in Southeast Florida be protected through “no take” designations. When looking at the disaggregated breakdown of SPA & ER users versus Non-SPA & ER users, the support for “no take” designation varies dramatically. On average, SPA & ER users support a “no take” percentage of 35%, while Non-SPA & ER users, on average, support designation at the level of 26%.

Using a more conservative measure of central tendency (the median) indicates that 50 percent of SPA & ER using residents would support that 25 percent or more of the coral reefs be protected in “no take zones”, while 50 percent of Non-SPA & ER using residents would support that 20 percent or more of the coral reefs be protected in “no take zones” (Figure 12).

While comparison of the mean and median show that SPA & ER Users desire higher levels of protection than Non SPA & ER Users (differences in means and medians are statistically significant), comparisons of the modes (the mode indicates the most common response) we see for SPA & ER users the mode, desired protection level, is 50%, while the mode for Non-SPA & ER users lies at 0%. These results indicate that there is a large rift at present between resident SPA & ER users and Non-SPA & ER using residents in the willingness to protect corals or natural reefs in Southeast Florida through “no take” designations.



	SPA & ER users	Non-SPA & ER users
Min	0	0
Max	100	100
Mean	35.13	26.09
Median	25	20
Mode	50	0

Figure 12. Monroe County Residents: Preference for Percentage of Southeast Florida Reef Protection in “No Take” zones

VI. Linking Ecological Monitoring Results with Socioeconomic Results

The purpose of a monitoring program for marine protected areas is to improve management of the system. Baseline and repeated measurements are taken to judge, over time, the effectiveness of carefully designed protected areas.

We choose to focus on four main attributes measured by the FKNMS Ecological Monitoring Program, with which we can integrate socioeconomic data from the 1995-96 and 2000-01 Reef Studies, to link ecological monitoring results with socioeconomic results to get the full picture of the performance of SPAs and ERs within the FKNMS. These attributes are 1) Diversity, 2) Abundance, 3) Amount of living coral, and 4) Water clarity (Clear Water-High Visibility). The main question we hope to answer is whether people perceive changes in the ecosystem that scientists are observing, or are there great differences between perceptions and scientific observations?

We do the comparisons between socioeconomic and ecological monitoring from two perspectives. First, we look at the trends across the entire FKNMS. For the socioeconomic measures we look at the differences in mean satisfaction scores between 1995-96 and 2000-01. We do this for all boating visitors and residents and for those more experienced versus less experienced visitor and resident boaters (more experienced users are those with five or more years of boating experience). The ecological measures are described below and can be found in greater detail in NOAA et al (2003). The results of the trends in the overall FKNMS are summarized in Table 9. Second, we compare SPAs and ERs to open or reference areas. For socioeconomic measures, we use comparisons of mean satisfaction ratings of SPA & ER Users versus Non-SPA & ER Users. The results for these comparisons are summarized in Table 10. Below we provide a detailed description of the summaries in Table 9 and 10.

Diversity: Overall FKNMS 1995-96 to 2000-01

Socioeconomic. There are two distinct questions from the Reef Study Surveys that pertain to the natural resource attribute of species diversity (for complete list of attributes see Appendix C).

- C. Many different kinds of fish and sea life to view
- D. Many different kinds of fish and sea life to catch

To capture resident and visitor perceptions of changes in species diversity within the FKNMS, we compare the mean satisfaction scores of respondents between the baseline 1995-96 results and 2000-01 responses to the two questions above. Visitors and residents indicated their satisfaction score on a scale of one (1) to five (5), with five representing the highest degree of satisfaction. The results are shown below.

Diversity - Satisfaction Scores 1995-96 versus 2000-01

	<u>Fish and Sea life to View</u>	<u>Fish and Sea life to Catch</u>
Visitors	-10.0%*	-9.5%*
Residents	-10.2%*	-11.3%*

* - Statistically significant

- Both visitors and residents perceive that species diversity levels within the FKNMS have declined from 1995-96 levels.

To further delve into the diversity question we felt it was necessary to further disaggregate the data to distinguish between experienced users and less experienced users. By accounting for experience, we hope to gain a greater indication of user's true perceptions, as those who lack experience have no frame of reference to understand changes in diversity within the FKNMS. Users were placed into the experienced group if they claimed five or more years of experience boating in Southeast Florida. All others were noted as less experienced.

Experienced versus Less Experienced Users

	<u>Fish and Sea life to View</u>	<u>Fish and Sea life to Catch</u>
Visitors	-9.4 %*	-12.1%*
Residents	-3.9%	-4.9%

* - Statistically significant

- Experienced users have lower satisfaction scores than less experienced users. For visitors, the differences are statistically significant, but for residents, the differences are not statistically significant.

Ecological. The ecological assessment on diversity is based on the REEF organizations fish count data using species richness. Jeffries (2003) has analyzed several years of REEF fish count data and concludes that species richness (diversity) has increased across the entire FKNMS.

Conclusion: Perceptions are not in agreement with scientific observations.

Abundance: Overall FKNMS 1995-96 to 2000-01

Socioeconomic. The measure for abundance was mean satisfaction scores for "Large numbers of fish" in 1995-96 versus 2000-01.

Large Numbers of Fish - Satisfaction scores 1995-96 vs. 2000-01

Visitors	-9.5%*
Residents	-13.3%*

* - Statistically significant

- Both visitors and resident satisfaction scores declined for "Large numbers of fish" or abundance. The declines were statistically significant

Experienced versus Less Experienced Users 2000-01

Visitors -12.9%*

Residents -7.8%

* - Statistically significant

- Visitors and residents with five or more years of experience in FKNMS had significantly lower satisfaction scores than less experienced visitors and residents.

Ecological. For the natural resource attribute of abundance we found a mixed set of results.

- From Bohnsack et al, as found in NOAA et al (2003):

Species targeted for fishing:

All *Grouper*, *Gray Snapper* and *Hogfish* had higher densities in 2001 versus 1994-1997 Baseline.

Yellowtail Snapper saw increases above baseline in fully protected zones, but declines in open fished areas.

Species not targeted for fishing:

Stoplight Parrotfish: Mean density decreased in both fished and fully protected zones

Striped Parrotfish: Mean density relatively constant.

- From Reef Environmental Education Foundation (REEF) as found in NOAA et al (2003):

- Both positive and negative trends for non-targeted species
- Generally positive trends for targeted species (*Hogfish*, *Black Grouper*, and *Red Grouper*)

- From Florida Marine Research Institute (FMRI) 2003:

Spiny Lobsters

Lobsters Landed – Recreational/Sport Fishing	Sport Season	
	Sport Season	Regular Season
1995-96	394,000	1,890,000
2000-01	455,000	1,347,000

Number per licensed fisherman	Sport Season	
	Sport Season	Regular Season
1995-96	7.58	19.89
2000-01	7.10	18.71

Licensed fishermen	Sport Season	Regular Season
	1995-96	52,000
2000-01	64,000	72,000

- 2001 was an extremely bad year for lobsters throughout Florida both for the recreational and commercial fisheries. This may have impacted the satisfaction scores.

Conclusion: Socioeconomic monitoring indicates a negative trend, while ecological monitoring has mixed results.

Amount of Living Coral: Overall FKNMS 1995-96 to 2000-01

Socioeconomic. The satisfaction scores for “the amount of living coral on the reefs” were compared for years 1995-96 and 2000-01.

Amount of Living Coral - Satisfaction Scores 1995-96 versus 2000-01

Visitors -10.4%*

Residents -14.2%*

* - Statistically significant

- Both visitors and residents had statistically significant declines in mean satisfaction scores.

Experienced versus Less Experienced Users

Visitors -10.8%*

Residents -2.4%

* - Statistically significant

- More experienced visitors had significantly lower mean satisfaction scores than less experienced visitors. There was not a statistically significant difference among resident reef users.

Ecological.

- From NOAA et al 2003:

- 1996-2000, a 37% decline in stony coral cover Sanctuary-wide
- 1996-2001, an increase in disease infections
- 1996-2001, decline in stony corals species richness for all habitat types.

Conclusion: Socioeconomic and Ecological monitoring in agreement. Users perceive the actual decline in coral cover.

Water Clarity (High Visibility): Overall FKNMS 1995-96 to 2000-01

Socioeconomic. Comparing the mean satisfaction scores for “Clear Water-High Visibility” in 1995-96 and 2000-01 assesses water clarity.

Clear Water (High Visibility) - Satisfaction Scores 1995-96 versus 2000-01

Visitors	-2.6%
Residents	-13.0%*

* - Statistically significant

- Although there were declines in mean satisfactions scores for both visitors and residents, only the decline in resident’s scores were significant.

Experienced versus Less Experienced Users

Visitors	-6.1%
Residents	-13.1%*

* - Statistically significant

- More experienced residents had significantly lower mean satisfaction scores than less experienced residents. More experienced visitors also had lower mean satisfaction scores than less experienced visitors, but visitor differences were not statistically significant.

Ecological. The FKNMS Ecological Monitoring Program has found “no trend” for water clarity as measured by light attenuation and turbidity (NOAA et al. 2003).

Conclusion: Socioeconomic and Ecological monitoring is in agreement for visitors, i.e., there has been no change in water clarity. However, residents perceive that water clarity has declined and this is even more prevalent among more experienced residents.

Table 9: Reef User Perceptions vs. Ecological Observations: Overall FKNMS

		Socioeconomics (Satisfaction Scores)		Ecological
		Trends (95-96 vs. 00-01) ¹	Experienced vs. Less Experienced ²	
Diversity				
Visitors	Significant Decline	Significantly Lower	Increase	
Residents	Significant Decline	Lower – Not Significant		
Abundance				
Visitors	Significant Decline	Significantly Lower	Targeted species (+)	
Residents	Significant Decline	Lower – Not Significant	Non-targeted species (+/-) Spiny Lobsters (-)	
Amount of Living Coral				
Visitors	Significant Decline	Significantly Lower	37% Decline in stony coral cover	
Residents	Significant Decline	Lower – Not Significant	Increase in disease infections	
Water Clarity				
Visitors	Lower – Not Significant	Lower – Not Significant	No trend	
Residents	Significantly Lower	Significantly Lower		

1. Trends are based on comparison of mean scores for 1995-96 samples of visitors and residents versus 2000-01 samples of visitors and residents. T-test for differences in means with significance cut-off at 0.05 or 95 percent confidence level

2. Experienced users are those with five or more years of experience in FKNMS. Statistical test is a T-test on mean satisfaction scores of experienced vs. less experienced samples of users from the 2000-01 survey. Significance cut-off is at 0.05 or 95 percent confidence level.

Sources: *Socioeconomics*, This report’s Tables 1 and 2.; *Ecological*, NOAA et al, 2003

Diversity – ‘No Take’ vs. Open (Reference) Areas

Socioeconomic. Static 2000-01 comparison of mean satisfaction scores between SPA & ER Users and Non Users for “Many different kinds of fish and sea life to view”.

Visitors	+13.7%*
Residents	-0.6%

* - Statistically significant

- Visitor SPA & ER Users have significantly higher mean satisfaction scores for diversity than Non SPA & ER Users.
- Resident SPA & ER Users have lower, but not statistically significant mean satisfaction scores for diversity.

Ecological. The ecological measure for diversity was species richness from REEF.

- Fully protected sites had higher species richness than open (reference) sites.

Conclusion: Overall, there was split agreement between the socioeconomic and ecological monitoring. SPAs and ERs are improving in diversity relative to open areas and visitors perceive the difference, while residents do not perceive the change.

Abundance – ‘No Take’ vs. Open (Reference) Areas

Socioeconomic. Static 2000-01 comparison of mean satisfaction scores between SPA & ER Users and Non SPA & ER Users for “Large numbers of fish”.

Visitors	+10.19%*
Residents	-4.92%

* - Statistically significant

- Visitor SPA & ER users had significantly higher satisfaction scores than non-users.
- For residents there was no significant difference in satisfaction scores between SPA & ER users and non-users.

Ecological. Overall results are mixed, but majority of results show protected areas doing better than open areas.

- From *Sea Stewards* as found in NOAA et al 2003:

Four Targets:

1. All species of reef-dwelling sea urchins
2. Adult three-spot damsel fish
3. Juvenile and adult Yellowtail damselfish
4. All known fish cleaning species

- Until 2001, no statistically significant differences were found between fully protected areas and reference areas for any of the four targets
- 2001, significantly more adult yellowtail damsel fish in reference zones versus fully protected zones
- 2001, cleaners (*Neon Goby/Blue head Wrasse*) no significant differences between fully protected and reference zones.

- From Bohnsack et al as found in NOAA et al 2003:

SPAs & ERs versus Open (reference) sites

Species Targeted for Fishing:

- *Yellowtail Snapper*: mean density significantly higher in fully protected zones than fished sites. Increases in protected zones above 1994-97 Baseline. Fished zones declined

- *All Grouper*: Mean Grouper density increased in both fully protected and fish sites. Densities in fully protected zones have increased faster than in fished areas, especially in 2000 and 2001.
- *Gray Snapper*: Mean density increased in 2001 in fished reference areas and remained stable at the upper end of the 1994-97 range in fully protected zones. Densities have remained higher in fully protected zones than in fished reference areas every year since 1997
- *Hogfish*: Mean density increased significantly in fished zones in 2001 and remained relatively constant in fully protected zones. Densities higher than 1994-97 in both fully protected and fished zones. Mean densities lower in fully protected zones versus fished reference areas.

Species Not Targeted for Fishing:

- *Stoptlight Parrotfish*: Mean density decreased in both fished and fully protected zones. Mean density was higher in fully protected zones relative to fished areas. Densities in fully protected areas were within 1994-97 performance range, but remained slightly below performance range in fished zones.
- *Striped Parrotfish*: Mean densities relatively constant over time in both fully protected and fished zones. Densities are slightly above long-term performance range in fully protected zones, but no difference between fully protected and fished zones.
- The passage of Hurricane Georges (a strong hurricane) and Mitch (a weak hurricane) in the fall of 1998 resulted in declines of mean density at both fished and unfished sites in 1999 for the two non-exploited parrotfish and Gray Snapper.
- No detrimental impacts on fish densities were noted following the passage of Hurricane Irene, a weak hurricane that passed over the Lower Keys in the fall of 1999.

- From *REEF* as found in NOAA et al 2003:

Abundance scores between 1994-2001 for 25 species

- There were no significant differences in mean trends of all 25 species between open and protected sites
- More species changed in abundance at protected sites than at open sites.

- From *FMRI* as found in NOAA et al 2003:

*Monitoring Caribbean Spiny Lobsters in the
Florida Keys National Marine Sanctuary, 1997-2001*

13 reserves with paired reference areas

- Highest abundance 1999
- Lowest abundance 1998
- In most years, total number of lobsters in reserves and references declined during open seasons, but the decline was less in protected areas

- During closed seasons in 1997-98, lobster abundance was nearly equal in reserve and reference areas
- Since 2000, considerably more lobsters have been found inside reserves than in reference areas during the closed season.
- There has been an increase in the percentage of legal-sized in Western Sambo ER over the last five years, while abundance at legal size lobsters in reference areas is lower.
- Increase in legal-sized lobster abundance in small SPAs relative to reference areas over the last five years
- Abundance at legal-sized lobster is higher on average at Looe Key than at the other SPAs, but it has not increased and is not higher than its reference area
- Carysfort (super SPA) – Abundance at legal-sized lobsters has been very low relative to its reference area and to small SPAs. No increasing abundance over last five years.
- Overall mean lobster size was below the legal limit in reserves and references in 1997
- Since protection, mean lobster size in reserves has been larger than legal size and comparatively larger than in references where it has remained below the legal limit
- There were no differences in size of legal lobsters between SPAs and references, but SPA lobsters were slightly larger on average
- There were no differences in size of legal lobsters between Looe Key SPA and Carysfort SPA and their respective reference areas despite the longevity of the Looe Key SPA and the size of the Carysfort “super” SPA
- There has been a significant increase in the size of legal-sized lobsters in the large Western Sambo ER
- Mean size of male lobsters on ER Offshore patch reefs has increased 10mm in the last 5 years
- Abundance of very large lobsters has increased in the ER relative to its reference area with males becoming larger and more abundant

Conclusion: Both Socioeconomic and Ecological monitoring have mixed results. But overall, both socioeconomic and ecological monitoring support the notion that SPAs & ERs are providing the benefits from improved quality of the protected sites.

Amount of Living Coral - ‘No Take’ vs. Open (Reference) Areas

Socioeconomic. Static comparison of 2000-01 mean satisfaction scores of SPA & ER Users and Non-Users for “The Amount of living coral on the reefs”.

Visitors	+4.56%*
Residents	-2.27%

* - Statistically significant

- Visitor SPA & ER Users had higher mean satisfaction scores than Non SPA & ER using visitors, and the difference was statistically significant.
- Although resident SPA & ER Users had lower mean satisfaction scores than Non SPA & ER using residents, the difference was not statistically significant.

Ecological. The loss in the amount of coral cover and increased incidence of diseases were found across the FKNMS and so there was no difference between the amount of coral cover in SPAs and ERs versus the open (reference) areas.

Conclusion: There is only a small difference between the results of the socioeconomic monitoring and ecological monitoring results when comparing amount of living coral on reef in SPAs and ERs versus open (reference) areas. Visitors that use the SPAs and ERs have slightly higher mean satisfaction scores than non-users, whereas there is no difference between resident reef users.

Water Clarity - ‘No Take’ vs. Open (Reference) Areas

Socioeconomic. Static comparison of 2000-01 mean satisfaction scores of SPA & ER Users and Non-Users for “Clear Water (High Visibility)”.

Visitors	+7.06%
Residents	-2.27%

- Visitor SPA & ER Users had higher mean satisfaction scores than Non SPA & ER using visitors, however the difference was not statistically significant.
- Although resident SPA & ER Users had lower mean satisfaction scores than Non SPA & ER using residents, the difference was not statistically significant.

Ecological. Water clarity was not compared in SPAs & ERs with open (reference) areas because water clarity would not be affected by the “no take” protection measure.

Conclusion: Users don’t perceive any changes in water clarity between SPAs & ERs and open (reference) areas. This is consistent with ecological monitoring that says there would be no expected differences.

Table 10. Reef User Perceptions vs. Ecological Observations: Comparison of SPAs & ERs to Open (Reference) Areas

Socioeconomics (Satisfaction Scores) 2000-01 Comparison: SPA & ER Users vs. Non-SPA & ER Users ¹		Ecological
Diversity		
Visitors	Significantly Higher	Higher for SPAs and ERs
Residents	Lower – Not Significant	
Abundance		
Visitors	Significantly Higher	Mixed Results (see write-up)
Residents	Lower – Not Significant	
Amount of Living Coral		
Visitors	Significantly Higher	No difference
Residents	Lower – Not Significant	
Water Clarity		
Visitors	Higher – Not Significant	No difference
Residents	No Difference	

1. Comparison of mean scores using T-test. Significance cut-off level is 0.05 or the 95 percent confidence level.

Sources: *Socioeconomics*, This report; *Ecological*, NOAA et al, 2003.

VII. Interpretation and Conclusions

Interpretation of the results in this study requires a conceptual model. Such a model was provided in Leeworthy and Bowker (1997). This model is reproduced here (see Figure 13).

The “Conceptual Model Linking the Economy and Environment” shows how both market and nonmarket economic values are linked to both “actual conditions” of the natural environment and the quantity and quality of facilities and services; and people’s “perceptions” of these conditions.

Although there is a direct connection between actual and perceptions of conditions and market and nonmarket economic values, there may be lags (delays in time) between people’s perceptions of conditions and changes in their behavior and/or preferences, which lead to changes in demand and market and nonmarket economic values. Also, there may be differences in changes in actual conditions (as measured by ecological monitoring) and perceived conditions (as measured by socioeconomic monitoring). Time delays in people’s responses (lags) to changed conditions (actual or perceived) present opportunities. If actual or perceived conditions are in decline, there may be time to either correct actual conditions (i.e., make the necessary investments to improve conditions) or if there is a difference in actual and perceived conditions (ecological and socioeconomic monitoring results are not in agreement), then opportunities exist to apply education and outreach efforts to correct misperceptions. In both cases, the objective is to avoid negative economic outcomes.

Our results show that many key natural resources attributes, facilities and services have increased in importance to people, while satisfaction with these natural resource attributes, facilities and services have declined. Plugging these results into our conceptual model linking the economy and environment leads to potentially dire predictions of the future natural resource-based economy, if actions are not taken to reverse these trends.

Another possible consequence of negative trends in satisfaction is the cost of attracting and educating “new” visitors. Our results show that for many natural resource attributes, facilities and services, satisfaction ratings are not only in decline, they are also relatively lower for more experienced visitors. The loss of repeat visitors raises the marketing costs of attracting “new” visitors and raises the costs of educating “new” visitors on how to interact with the areas’ natural resources and support sustainable tourism. Borrowing a phrase from the clothing retailer Syms, “An educated consumer is our best customer.”

Our comparison of SPA & ER Users with Non Users demonstrates that the SPAs and ERs are already starting to generate the benefits of the increased level of protection afforded these areas and its users.

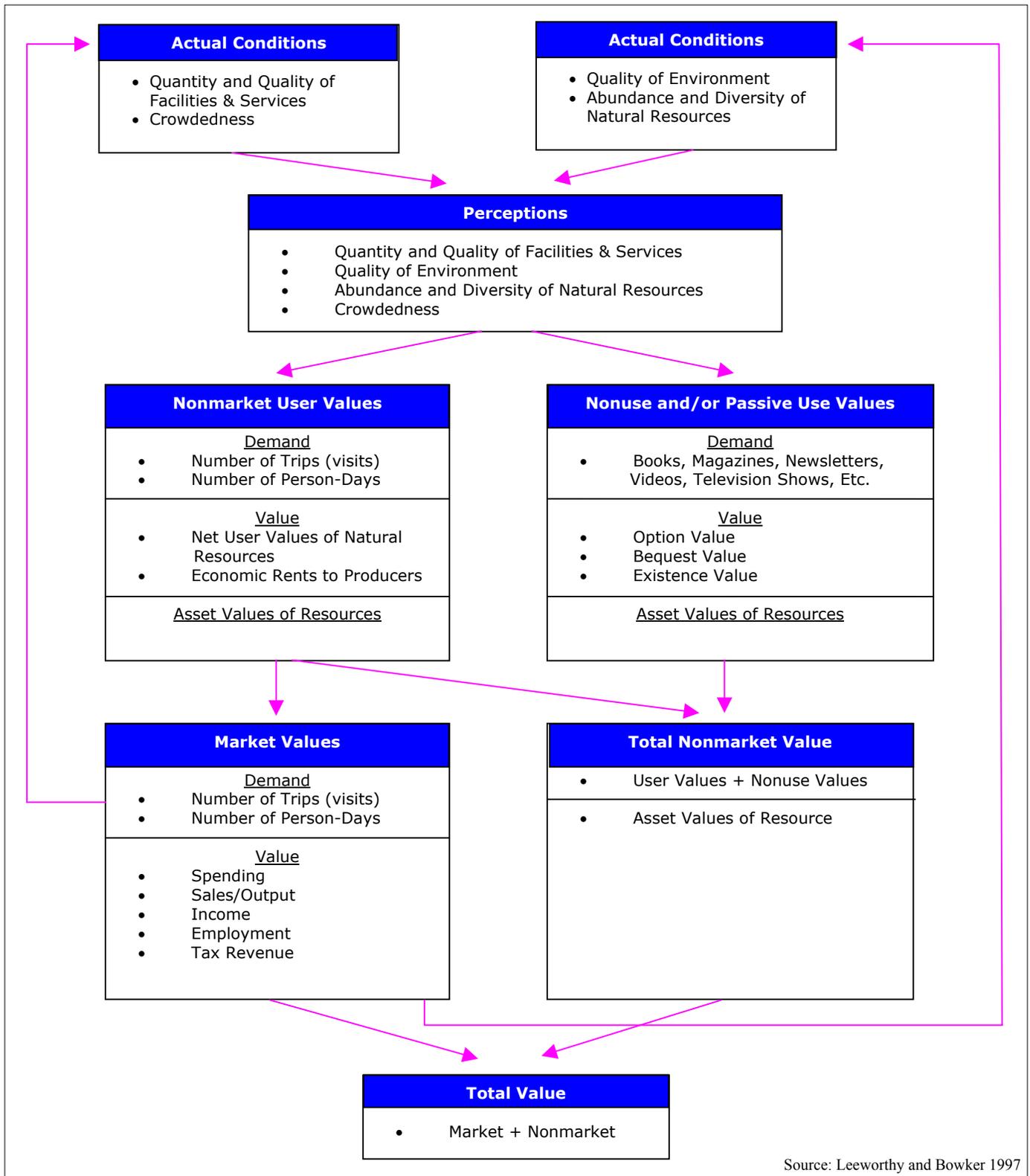
The comparisons of the overall trends across the entire FKNMS for socioeconomic and ecological monitoring results produced some interesting findings:

Water Clarity. Socioeconomic and ecological monitoring are in agreement for visitors, i.e. there has been no change in water clarity. However, residents perceive water clarity has declined, and this is more prevalent among more experienced residents. This might be a possible job for education and outreach, if residents are misperceiving the actual water clarity conditions.

Diversity. There was disagreement between socioeconomic and ecological monitoring results. Users perceive a decline, while physical scientists say actual conditions are improving. This would appear to be a job for education and outreach to correct these misperceptions. Perhaps the ratings on diversity were influenced by the status of the amount of living coral on the reefs (see below).

Abundance. Here users perceive significant declines, while ecological monitoring produced mixed results. Here there are needs to both make greater investments in protecting and restoring resources and in education and outreach efforts.

Figure 13. Conceptual Model Linking the Economy and the Environment



Source: Leeworthy and Bowker 1997

Amount of Living Coral on Reefs. Here socioeconomic and ecological monitoring is in agreement. Physical scientists are observing significant declines in stony coral cover and increases in diseases, and users are perceiving these declines. Here there is a clear need to identify the sources and solutions to the problems. Given the higher use and economic value of the natural versus artificial reefs in the FKNMS (see Johns et al, 2003), there is economic justification to make the investments to solve these problems before they translate into economic losses.

Some have expressed special interest in the socioeconomic variable “Value for the Price”, and for understanding how the “Average Daily Rate (ADR)” for hotels and motels can be interpreted. Below we address how both of these indicators would be interpreted using our conceptual model and economic theory.

Value for the Price. People have a lot of choices when planning their travel. A negative trend in satisfaction for this indicator could mean future declines in demand for trips (visits) to the Florida Keys and negative impacts on the local economy. Indeed this should be of concern, since our results show both significant increases in importance of “Value for the Price” to boating visitors and significant declines in satisfaction ratings (see Table 1).

The negative trend in satisfaction ratings among resident boaters should also be of concern to local businesses, since residents could also choose to recreate elsewhere, diverting their spending to areas outside the Florida Keys, also resulting in negative economic impact on the Florida Keys economy.

Price Elasticity and the Average Daily Rate (ADR). A closely related issue to “Value for the Price” is the price elasticity of demand for trips to the Florida Keys. Price elasticity is an economic concept based on consumers’ demand for a good or service (here trips to the Florida Keys). Price elasticity quantifies the relationship between how the quantity of trips demanded responds to changes in prices, holding all other factors constant (e.g., income, age, race/ethnicity, satisfaction ratings, etc.). The Monroe County Tourist Development Council, Marketing Research Department has noted that the “Average Daily Rate (ADR) for hotels and motels is used as one indicator of the health of the tourist industry. The ADR has increased from \$115.22 in 1995 to \$142.08 in 2001. This translates into an increase of 23.3% in nominal dollars and an increase of 9.1% in inflation-adjusted 1995 dollars (2001 rate is \$125.74 in 1995 dollars). This short-run increase is a positive development, but caution is in order here.

We will show below that the results are consistent with short-run price inelasticity of demand for trips for the Florida Keys. However, price elasticity is a time-dependent economic measure and the longer the time period the more elastic (responsive) is demand. As people have more time to adjust their behavior (learn more about other destinations), price elasticity will increase. When demand is inelastic, price increases will result in relatively small decreases in quantity demanded resulting in increases in total revenue. When demand is elastic, price increases result in relatively large decreases in quantity demanded resulting in decreases in total revenue.

Leeworthy and Bowker (1997) estimated the price elasticity of demand for visitor trips to the Florida Keys during the 1995-96 summer and winter seasons. The price elasticities of demand for both seasons were inelastic. Using this model, we would predict that, in the short-run, the increases in the ADR would result in decreases in visitation (lower occupancy rates) and an increase in total lodging revenues. This prediction was confirmed. Occupancy rates in the Florida Keys, from Smith Travel Services, declined from 79.3% in 1995-96 to 67.3% in 2000-01. The Florida Department of Revenue reports that total revenues from lodging increased from \$376.36 million in 1995-96 to \$545.48 million in 2000-01. That translates into a 44.9% increase in nominal dollars and a 28.8% increase in inflation adjusted dollars (the 2000-01 lodging revenue was \$482.76 million in 1995 dollars).

Total visitation is lower, while total revenues increase. Lower visitation (room use) results in lower costs and thus higher profits, also, possibly less environmental impact for a given level of profits (a win-win situation for the economy and the environment). Thus, as we said above, this short-run increase in lodging price is a positive development.

But will this result hold over the long run? Given longer time periods to adjust, demand will become more elastic (more responsive) and it is possible that total revenues to the lodging industry could decline. It also depends on, to a large extent, other factors. Household incomes could increase and willingness to pay for Florida Keys trips could increase. If satisfaction with “Service and Friendliness of people” were to improve, this could also shift demand upwards and offset negative reactions to price increases. If satisfaction with the natural resource attributes, facilities and services continue on their downward trend, demand could shift downwards resulting in future demand and total revenues to all businesses going down. This is the larger negative economic outcome that can hopefully be avoided with investments to understand and correct problems and/or education and outreach efforts to correct misperceptions when and where they exist.

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APPENDIX A

Figure A1. Importance/Satisfaction Matrix Code Descriptions, Graph of Means and Descriptive Statistics, Visitor Survey 1995-96

Code From Matrix - Description	Graph of Mean	Mean	Standard Error	N	% Rated	
<u>Natural Resources</u>						
A. Clear Water (high visibility)		4.13	0.9306	850	93	
		S	3.82	0.9144	827	90
B. Amount of living coral on reefs		I	3.98	1.1387	809	88
		S	3.74	0.8252	668	73
C. Many different kinds of fish and sea life to view		I	3.98	1.0376	843	92
		S	3.82	0.7969	742	81
D. Many different kinds of fish and sea life to catch		I	3.12	1.5388	784	85
		S	3.65	0.9059	507	55
E. Opportunity to view large wildlife: manatees, whales, dolphins, seaturtles		I	3.69	1.1491	841	92
		S	3.36	1.0036	667	73
F. Large Numbers of Fish		I	3.76	1.1681	832	91
		S	3.54	0.9355	697	76
G. Quality of beaches		I	4.15	0.9878	842	92
		S	3.45	0.8941	708	77
<u>Natural Resource Facilities</u>						
H. Parks and specially protected areas		3.97	1.0072	849	93	
		S	3.81	0.7078	678	74
I. Shoreline access		I	3.82	1.0797	831	91
		S	3.40	0.8658	699	76
J. Designated swimming/beach areas		I	3.69	1.1862	835	91
		S	3.40	0.9006	670	73
K. Mooring buoys near coral reefs		I	3.64	1.3715	705	77
		S	3.88	0.8035	430	47
L. Marina facilities		I	2.77	1.3112	715	78
		S	3.75	0.6894	436	48
M. Boat ramps/launching facilities		I	2.68	1.3432	703	77
		S	3.62	0.7997	342	37
<u>Other Facilities</u>						
N. Historic preservation (historic landmarks, houses, etc.)			3.68	1.0669	839	91
	S		3.89	0.6732	640	70
O. Parking	I		3.22	1.1361	813	89
	S		3.38	0.9041	696	76
P. Public transportation	I		2.08	1.2230	699	76
	S		3.25	0.9201	274	30
Q. Directional signs, street signs, mile markers	I		3.70	1.0796	861	94
	S		3.67	0.8997	825	90
R. Condition of bike paths and sidewalks/walking paths	I		3.46	1.1422	802	87
	S		3.63	0.7746	607	66
S. Condition of roads and streets	I		3.61	0.9727	861	94
	S		3.64	0.7079	835	91
T. Availability of public restrooms	I		3.80	1.0369	849	93
	S		3.32	0.8478	708	77
U. Cleanliness of streets and sidewalks	I	3.75	0.9353	856	93	
	S	3.63	0.7539	806	88	
V. Uncrowded conditions	I	3.56	1.0520	845	92	
	S	3.44	0.8169	815	89	
<u>Services</u>						
W. Maps, brochures, and other tourist information		3.32	1.1591	835	91	
		S	3.86	0.7761	700	76
X. Service and friendliness of people		I	4.16	0.8593	866	94
		S	3.90	0.7572	824	90
Y. Value for the price		I	4.14	0.8817	859	94
		S	3.30	0.8217	816	89

I - Importance, S - Satisfaction

Figure A2. Importance/Satisfaction Matrix Code Descriptions, Graph of Means and Descriptive Statistics, Visitor Survey 2000-01

Code From Matrix - Description	Graph of Mean	Mean	Standard Error	N	% Rated		
<u>Natural Resources</u>							
A. Clear Water (high visibility)		4.44	0.0491	264	96		
		S	3.70	0.0670	258	94	
B. Amount of living coral on reefs		I	4.31	0.0600	257	93	
		S	3.35	0.0766	229	83	
C. Many different kinds of fish and sea life to view		I	4.36	0.0547	236	86	
		S	2.97	0.0663	250	91	
D. Many different kinds of fish and sea life to catch		I	3.38	0.0997	245	89	
		S	2.98	0.0890	171	62	
E. Opportunity to view large wildlife: manatees, whales, dolphins, seaturtles		I	4.07	0.0683	260	95	
		S	3.44	0.0795	221	80	
F. Large Numbers of Fish		I	4.16	0.0583	258	94	
		S	3.30	0.0724	241	88	
G. Quality of beaches		I	4.39	0.0538	262	95	
		S	3.20	0.0767	235	85	
<u>Natural Resource Facilities</u>							
H. Parks and specially protected areas			4.25	0.0543	264	96	
	S		3.45	0.0639	236	86	
I. Shoreline access	I		4.00	0.0565	257	93	
	S		3.03	0.0709	231	84	
J. Designated swimming/beach areas	I		4.02	0.0618	260	95	
	S		3.07	0.0725	240	87	
K. Mooring buoys near coral reefs	I		3.88	0.0828	234	85	
	S		3.44	0.0817	167	61	
L. Marina facilities	I		2.94	0.0876	218	79	
	S		3.37	0.0749	155	56	
M. Boat ramps/launching facilities	I		2.73	0.0906	211	77	
	S		3.14	0.0840	125	45	
<u>Other Facilities</u>							
N. Historic preservation (historic landmarks, houses, etc.)			3.95	0.0665	259	94	
			S	3.55	0.0676	213	77
O. Parking			I	3.46	0.0753	252	92
		S	2.98	0.0795	229	83	
P. Public transportation		I	2.34	0.0833	230	84	
		S	2.97	0.0973	128	47	
Q. Directional signs, street signs, mile markers		I	3.83	0.0664	264	96	
		S	3.28	0.0661	254	92	
R. Condition of bike paths and sidewalks/walking paths		I	3.58	0.0683	253	92	
		S	3.20	0.0695	214	78	
S. Condition of roads and streets		I	3.69	0.0583	264	96	
		S	3.28	0.0585	257	93	
T. Availability of public restrooms		I	3.97	0.0601	263	96	
		S	3.11	0.0691	241	88	
U. Cleanliness of streets and sidewalks		I	3.90	0.0562	264	96	
		S	3.30	0.0647	253	92	
V. Uncrowded conditions	I	3.83	0.0598	264	96		
	S	2.97	0.0635	261	95		
<u>Services</u>							
W. Maps, brochures, and other tourist information		3.55	0.0663	260	95		
		S	3.52	0.0574	242	88	
X. Service and friendliness of people		I	4.25	0.0516	263	96	
		S	3.65	0.0618	252	92	
Y. Value for the price		I	4.33	0.0572	264	96	
		S	2.92	0.0673	241	88	

I - Importance, S - Satisfaction

Figure A3. Importance/Satisfaction Matrix Code Descriptions, Graph of Means and Descriptive Statistics, Resident Survey 1995-96

Code From Matrix - Description	Graph of Mean	Mean	Standard Error	N	% Rated
<u>Natural Resources</u>					
A. Clear Water (high visibility)		4.51	0.7940	443	97
B. Amount of living coral on reefs		4.57	0.8230	432	95
C. Many different kinds of fish and sea life to view		4.38	0.9272	440	97
D. Many different kinds of fish and sea life to catch		3.64	1.4349	428	94
E. Opportunity to view large wildlife: manatees, whales, dolphins, seaturtles		3.85	1.1904	439	96
F. Large Numbers of Fish		4.29	0.9895	441	97
G. Quality of beaches		4.20	1.1048	440	97
<u>Natural Resource Facilities</u>					
H. Parks and specially protected areas		4.02	1.1551	440	97
I. Shoreline access		3.72	1.2474	431	95
J. Designated swimming/beach areas		3.67	1.2829	435	96
K. Mooring buoys near coral reefs		4.36	1.0836	427	94
L. Marina facilities		2.98	1.2812	403	89
M. Boat ramps/launching facilities		2.80	1.3620	386	85
<u>Other Facilities</u>					
N. Historic preservation (historic landmarks, houses, etc.)		3.90	1.1700	439	96
O. Parking		2.90	1.1959	406	89
P. Public transportation		2.24	1.2260	355	78
Q. Directional signs, street signs, mile markers		3.35	1.3313	431	95
R. Condition of bike paths and sidewalks/walking paths		3.93	1.1449	429	94
S. Condition of roads and streets		3.68	1.1328	437	96
T. Availability of public restrooms		3.60	1.2151	425	93
U. Cleanliness of streets and sidewalks		3.99	1.0238	436	96
V. Uncrowded conditions		4.08	1.0544	438	96
<u>Services</u>					
W. Maps, brochures, and other tourist information		2.66	1.2922	408	90
X. Service and friendliness of people		4.15	1.0193	438	96
Y. Value for the price		4.07	1.0340	436	96

I - Importance, S - Satisfaction

Figure A4. Importance/Satisfaction Matrix Code Descriptions, Graph of Means and Descriptive Statistics, Visitor Survey 2000-01

Code From Matrix - Description	Graph of Mean	Mean	Standard Error	N	% Rated
Natural Resources					
A. Clear Water (high visibility)		4.40	0.0415	572	94
		2.97	0.0505	523	86
B. Amount of living coral on reefs		4.45	0.0400	562	92
		2.74	0.0494	512	84
C. Many different kinds of fish and sea life to view		4.30	0.0416	560	92
		3.14	0.0463	515	85
D. Many different kinds of fish and sea life to catch		3.91	0.0507	555	91
		3.03	0.0470	489	80
E. Opportunity to view large wildlife: manatees, whales, dolphins, seaturtles		3.87	0.0516	554	91
		2.97	0.0502	491	81
F. Large Numbers of Fish		4.20	0.0438	570	94
		2.74	0.0487	516	85
G. Quality of beaches		3.97	0.0545	544	89
		2.44	0.0557	450	74
Natural Resource Facilities					
H. Parks and specially protected areas		3.62	0.0549	544	89
		3.09	0.0473	481	79
I. Shoreline access		3.15	0.0595	514	84
		2.65	0.0554	413	68
J. Designated swimming/beach areas		3.18	0.0586	527	87
		2.71	0.0511	428	70
K. Mooring buoys near coral reefs		4.26	0.0485	561	92
		3.05	0.0527	504	83
L. Marina facilities		2.67	0.0555	512	84
		3.10	0.0514	383	63
M. Boat ramps/launching facilities		2.36	0.0565	487	80
		2.88	0.0640	331	54
Other Facilities					
N. Historic preservation (historic landmarks, houses, etc.)		3.39	0.0568	540	89
		3.11	0.0461	426	70
O. Parking		2.02	0.0577	431	71
		2.78	0.0689	269	44
P. Public transportation		1.78	0.0577	421	69
		2.62	0.0812	234	38
Q. Directional signs, street signs, mile markers		2.57	0.0634	498	82
		3.11	0.0551	355	58
R. Condition of bike paths and sidewalks/walking paths		3.30	0.0572	516	85
		2.75	0.0535	415	68
S. Condition of roads and streets		2.96	0.0572	512	84
		3.00	0.0492	416	68
T. Availability of public restrooms		3.16	0.0578	525	86
		2.58	0.0540	421	69
U. Cleanliness of streets and sidewalks		3.48	0.0562	518	85
		2.86	0.0524	435	71
V. Uncrowded conditions		4.12	0.0446	558	92
		2.57	0.0516	499	82
Services					
W. Maps, brochures, and other tourist information		2.21	0.0570	500	82
		3.08	0.0620	315	52
X. Service and friendliness of people		3.78	0.0522	547	90
		3.17	0.0478	466	77
Y. Value for the price		3.74	0.0534	517	85
		2.69	0.0511	441	72

I - Importance, S - Satisfaction

APPENDIX B Socioeconomic Profiles

Visitor Profiles

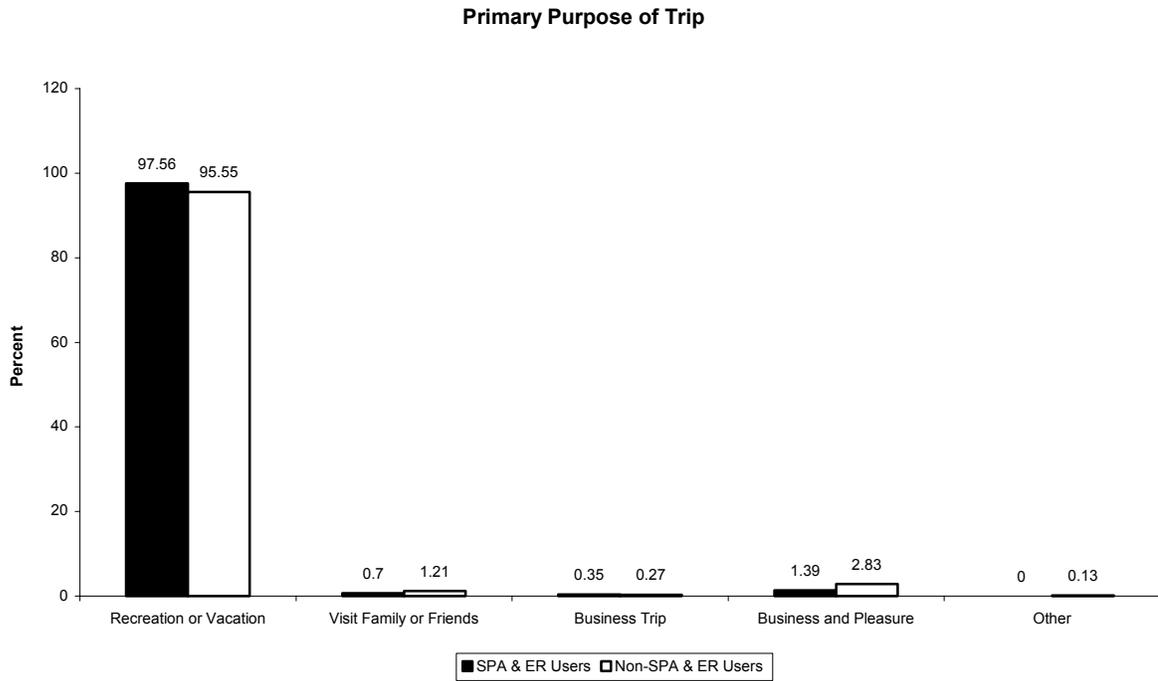


Figure B1. Visitor Profile: Primary Purpose of Trip, SPA & ER Users vs. Non Users

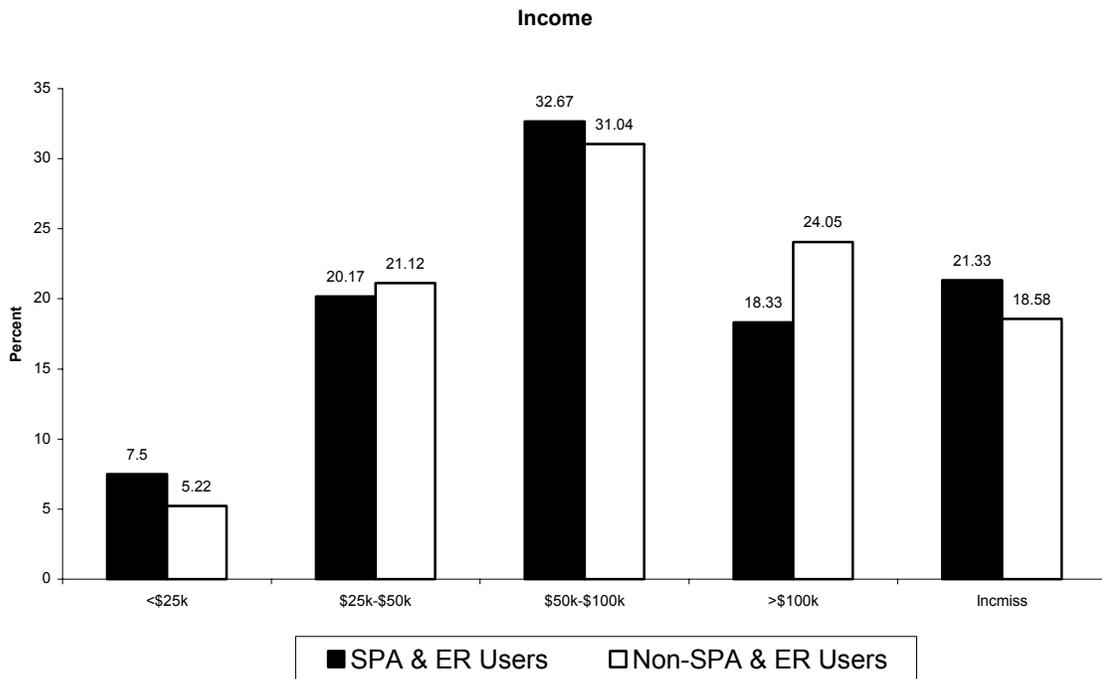


Figure B2. Visitor Profile: Income Comparison, SPA & ER Users vs. Non Users

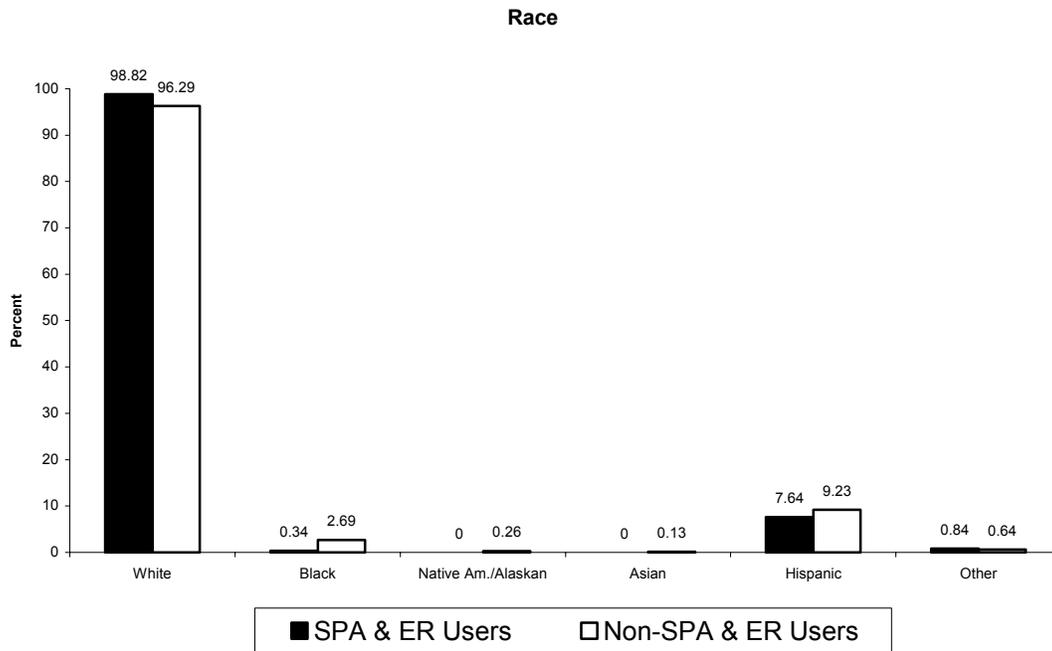


Figure B3. Visitor Profile: Race Breakdown, SPA & ER Users vs. Non Users

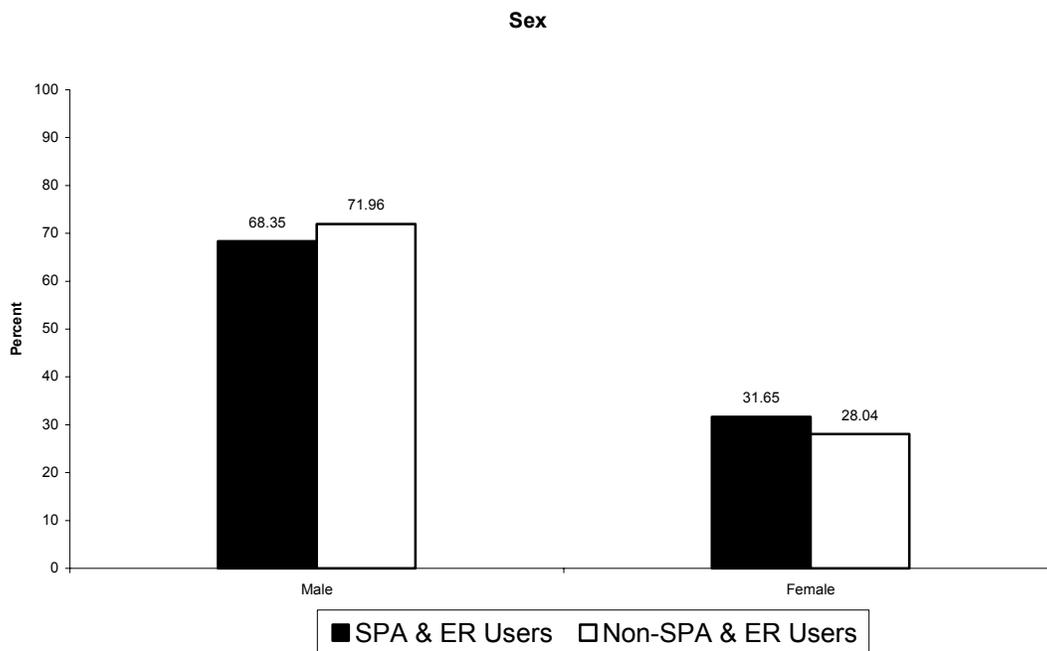


Figure B4. Visitor Profile: Distribution by Sex, SPA & ER Users vs. Non Users

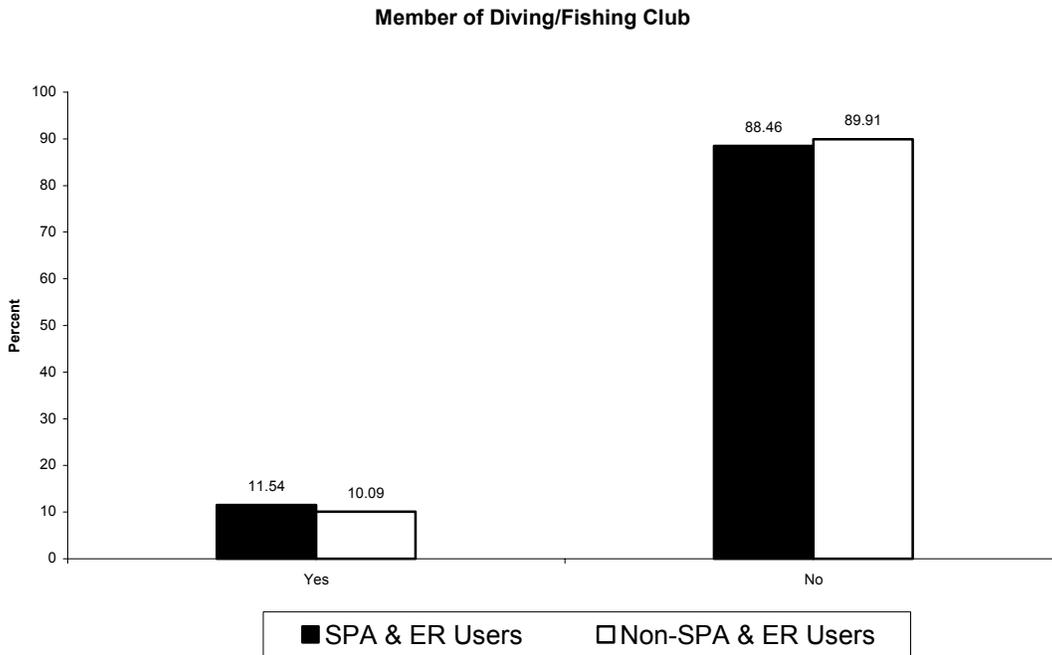


Figure B5. Visitor Profile: Diving/Fishing Club Membership, SPA & ER Users vs. Non Users

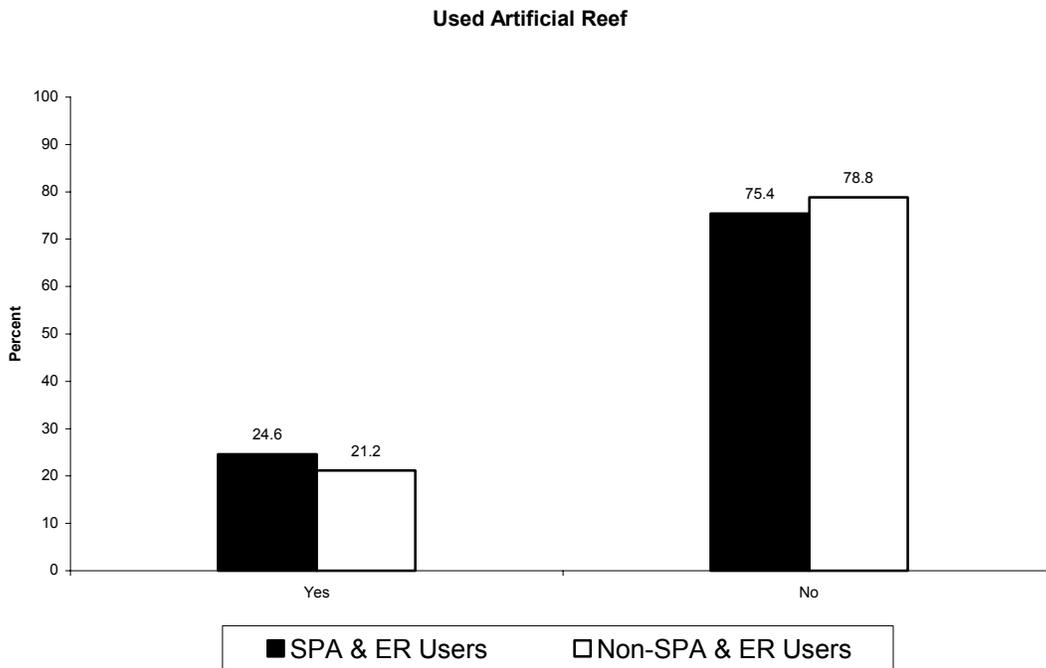


Figure B6. Visitor Profile: Artificial Reef Usage, SPA & ER Users vs. Non Users

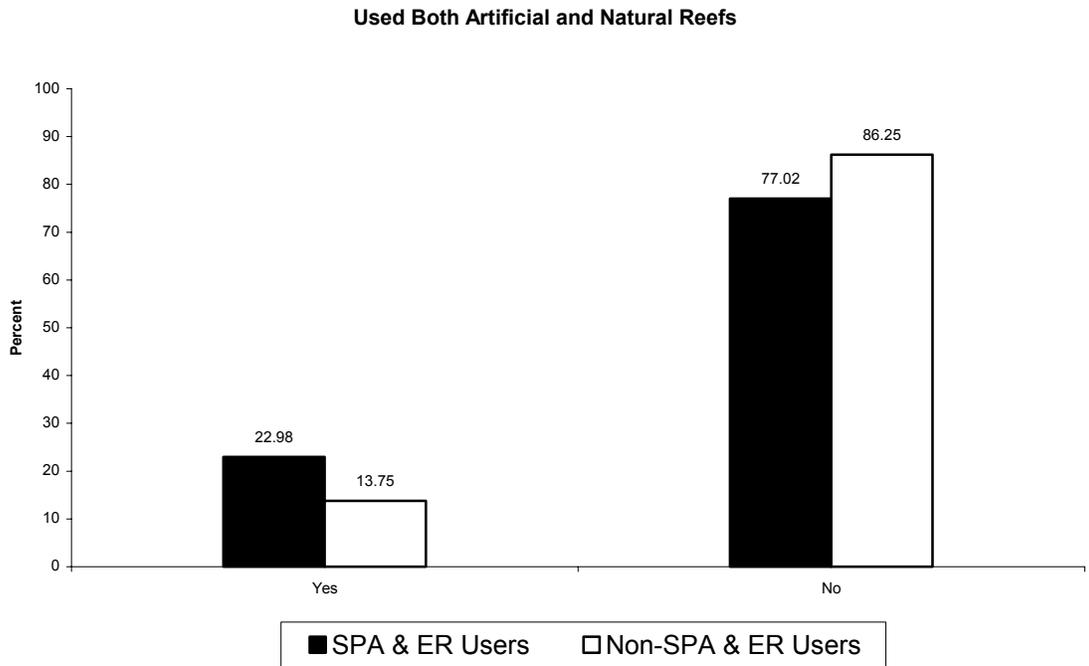


Figure B7. Visitor Profile: Both Artificial and Natural Reef Usage, SPA & ER Users vs. Non Users

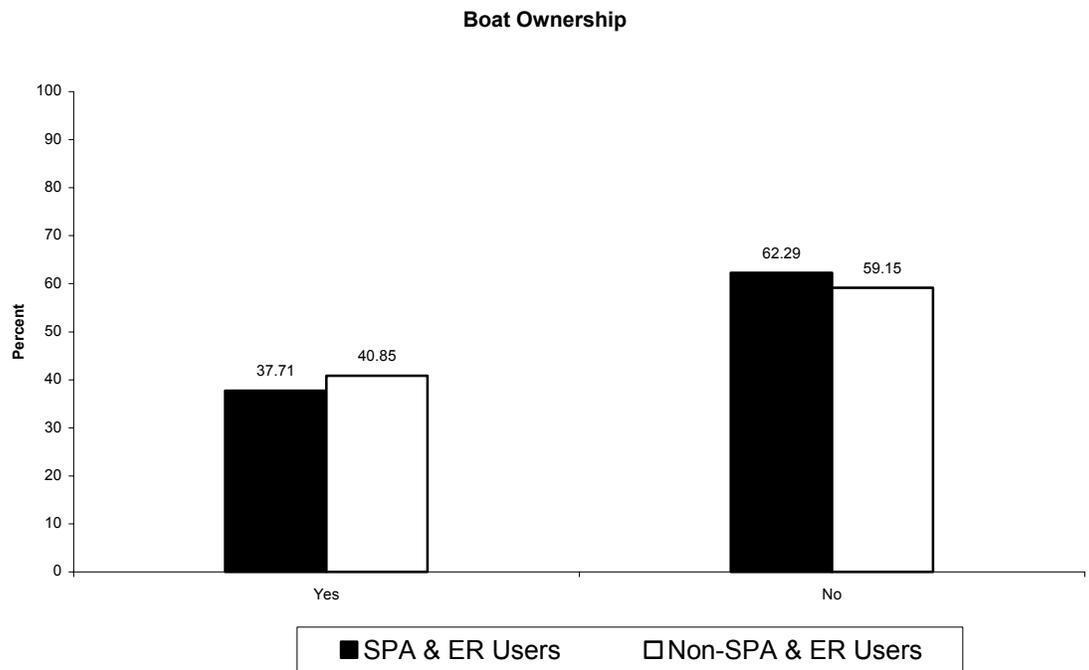


Figure B8. Visitor Profile: Boat Ownership, SPA & ER Users vs. Non Users

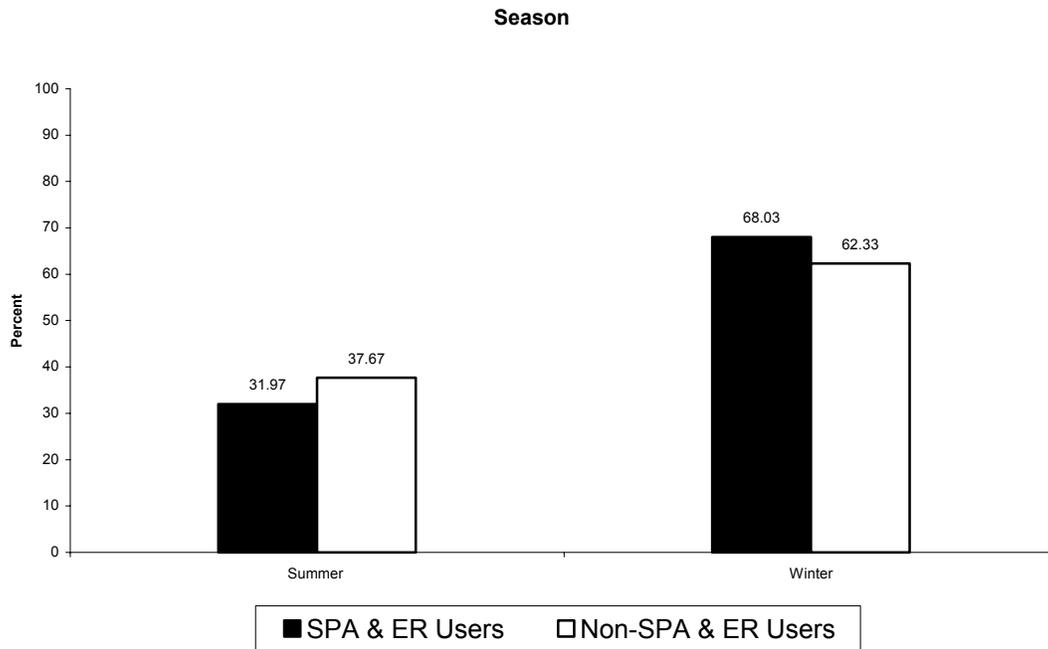


Figure B9. Visitor Profile: Seasonal Distribution, SPA & ER Users vs. Non Users

Table B1. Visitor Profile: Experience (Years Boating in South Florida)

	SPA & ER users	Non-SPA & ER users
Minimum	0	0
Maximum	52	63
Mean	7.06	7.51
Median	1.00	2.00
Mode	1.00	1.00

Table B2. Visitor Profile: Number of Times Visiting Monroe County last 12 months

	SPA & ER users	Non-SPA & ER users
Minimum	1	0
Maximum	52	156
Mean	2.49	3.11
Median	1.00	1.00
Mode	1.00	1.00

Table B3. Visitor Profile: Number of Days Visiting Monroe County over last 12 months

	SPA & ER users	Non-SPA & ER users
Minimum	1	1
Maximum	143	165
Mean	10.53	12.45
Median	6.00	7.00
Mode	3.00	4.00

Table B4. Visitor Profile: Number of Overnight Trips to Monroe County last 12 months

	SPA & ER users	Non-SPA & ER users
Minimum	0	0
Maximum	52	60
Mean	1.91	2.13
Median	1.00	1.00
Mode	1.00	1.00

Table B5. Visitor Profile: Number of Nights Stayed in Monroe County – Current Trip

	SPA & ER users	Non-SPA & ER users
Minimum	0	0
Maximum	133	156
Mean	6.82	7.83
Median	4.00	4.00
Mode	2.00	2.00

Table B6. Visitor Profile: Number of Trips on Reefs over last 12 months

	SPA & ER users	Non-SPA & ER users
Minimum	1	1
Maximum	103	205
Mean	2.96	2.99
Median	1.00	1.00
Mode	1.00	1.00

Table B7. Visitor Profile: Percent of SPA & ER Users and Non Users by State of Residence

	<u>Users</u>	<u>Non Users</u>		<u>Users</u>	<u>Non Users</u>
AK	0.17	0.26	MS	0.50	0.13
AL	0.67	0.13	MT	0.00	0.13
AR	0.00	0.13	NC	1.66	2.30
AZ	0.00	0.77	NE	0.17	0.13
CA	0.67	1.53	NH	0.33	0.77
CO	1.00	1.15	NJ	2.33	3.57
CT	2.00	0.51	NM	0.50	0.13
DC	0.33	0.51	NV	0.00	0.13
DE	0.33	0.64	NY	4.33	4.34
FL	38.77	35.33	OH	3.99	3.19
FOREIGN	8.65	7.02	OK	0.00	0.26
GA	2.50	2.93	OR	0.33	0.26
ID	0.50	0.38	PA	3.33	3.83
IL	4.33	5.10	PR	0.00	0.13
IN	1.50	1.79	RI	0.50	0.51
IO	0.17	0.26	SC	0.83	1.02
KS	0.00	0.77	SD	0.33	0.00
KY	1.00	0.51	TN	1.00	2.04
LA	0.33	0.13	TX	2.00	2.04
MA	1.50	2.68	VA	1.83	1.79
MD	1.00	1.40	VI	0.00	0.13
ME	0.50	0.77	VT	0.17	0.26
MI	4.83	4.46	WA	0.50	0.13
MN	0.83	1.28	WI	2.50	1.53
MO	1.00	0.77	WV	0.33	0.13

Table B8. Visitor Profile: Percent of SPA & ER Users and Non Users by Country of Residence

	<u>Users</u>	<u>Non Users</u>		<u>Users</u>	<u>Non Users</u>
Argentina	0.00	0.13	Italy	0.17	0.13
Belgium	0.00	0.26	Mexico	0.17	0.26
Canada	2.57	2.19	New Zealand	0.00	0.13
Columbia	0.00	0.26	Norway	0.17	0.13
England	1.54	0.39	Sweden	0.17	0.13
France	0.00	0.39	Switzerland	0.17	0.00
Germany	0.17	0.77	USA	94.51	94.20
Guatemala	0.00	0.13	Uruguay	0.00	0.13
Haiti	0.17	0.00	Venezuela	0.17	0.00
Holland	0.00	0.39			

Resident Profiles

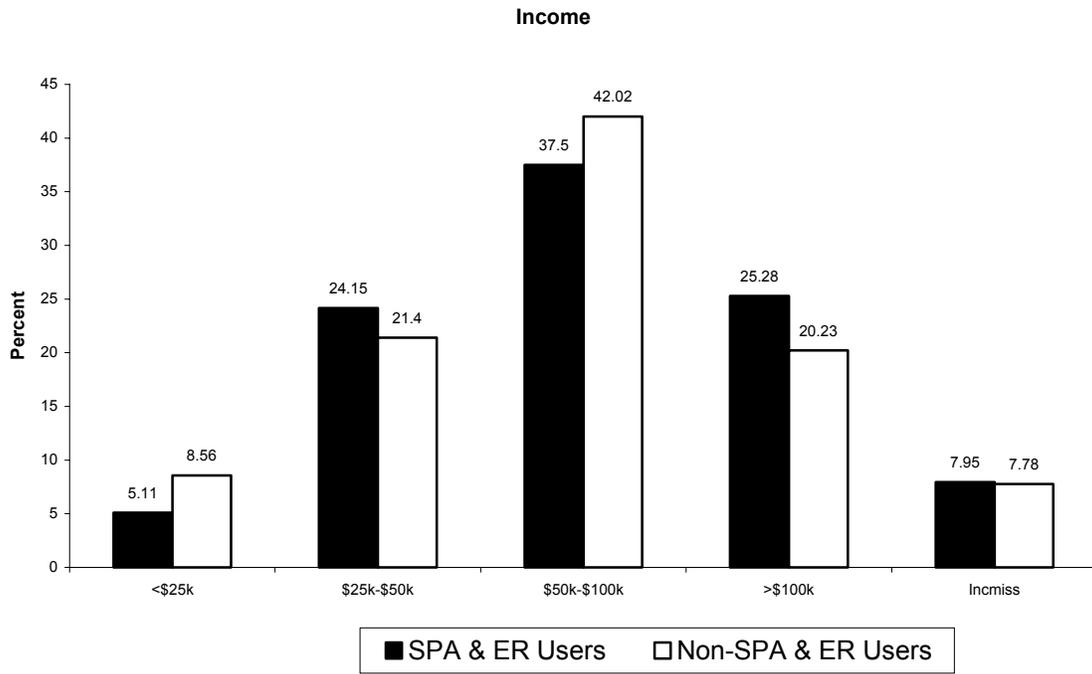


Figure B10. Monroe County Resident Profile: Income Comparison, SPA & ER Users vs. Non Users

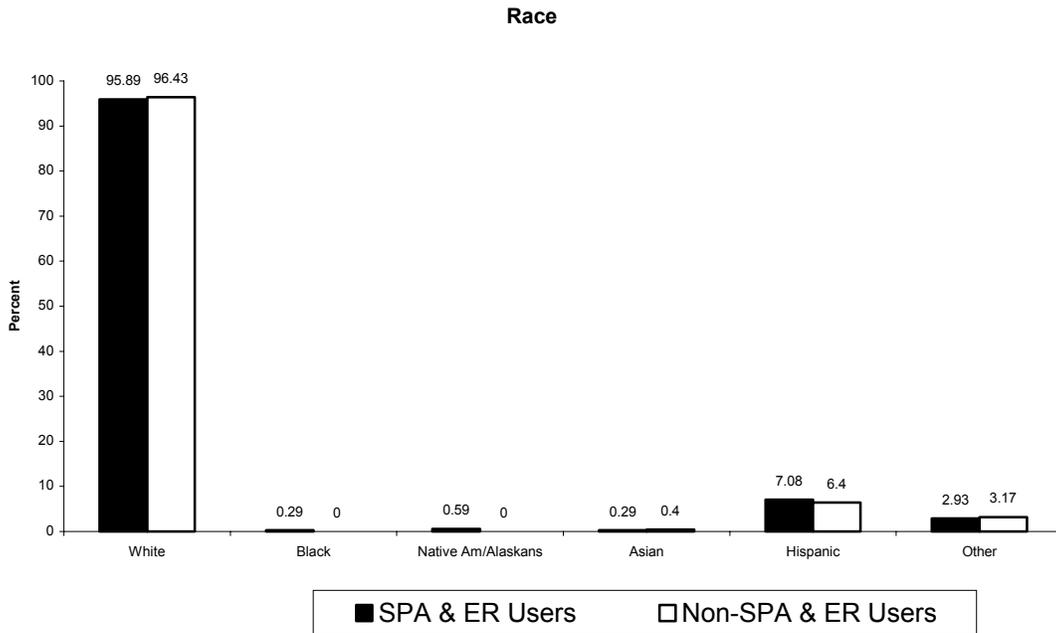


Figure B11. Monroe County Resident Profile: Race Breakdown, SPA & ER Users vs. Non Users

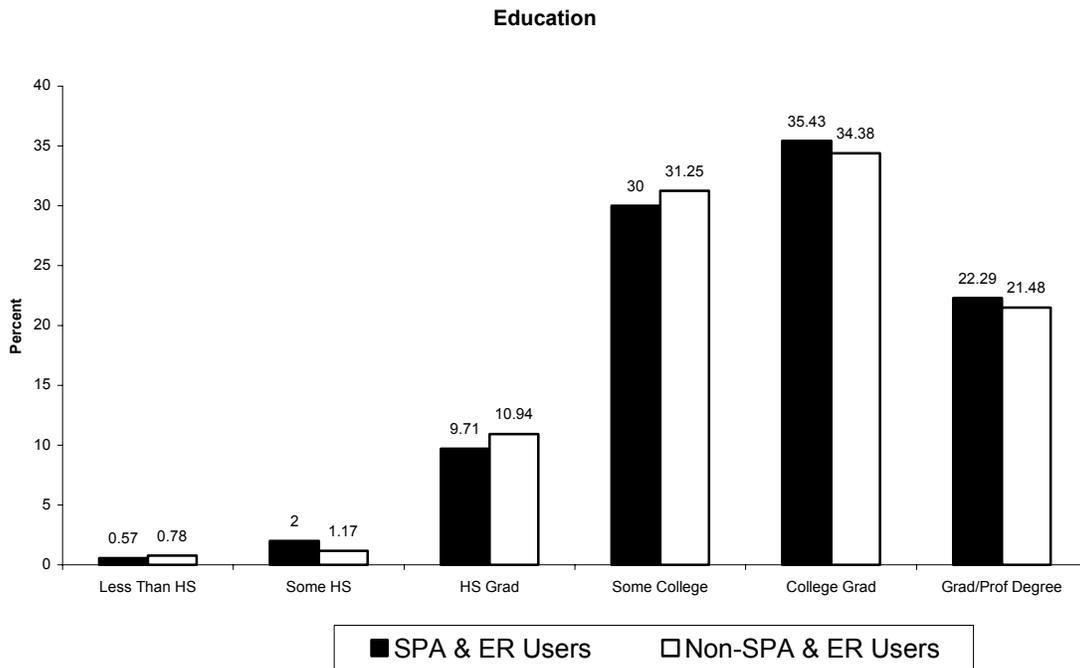


Figure B12. Monroe County Resident Profile: Education Attainment, SPA & ER Users vs. Non Users

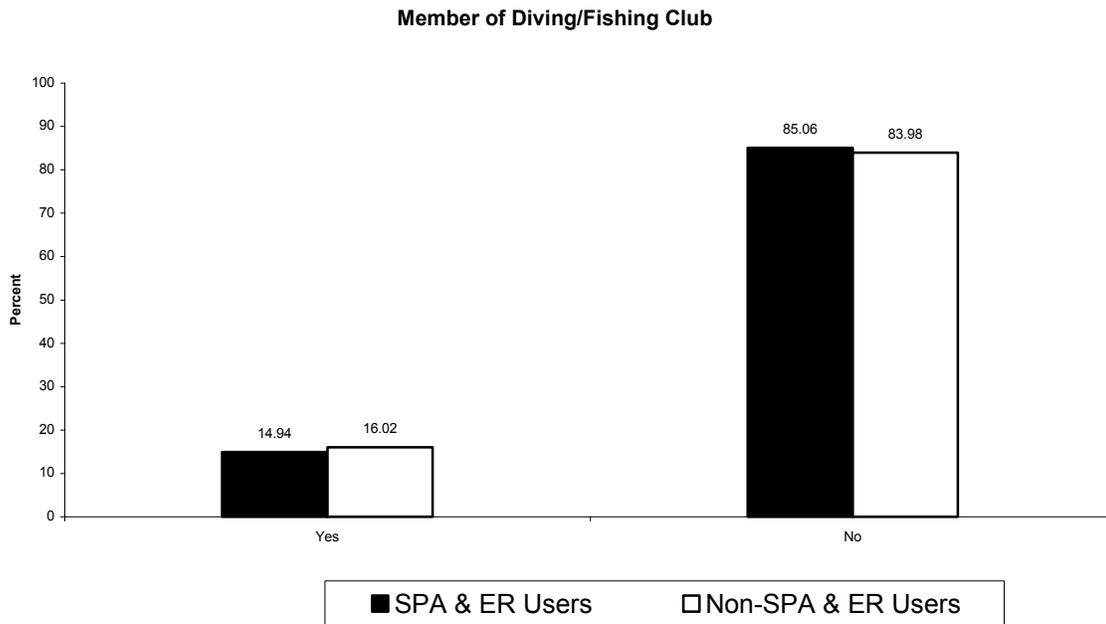


Figure B13. Monroe County Resident Profile: Diving/Fishing Club Membership, SPA & ER Users vs. Non Users

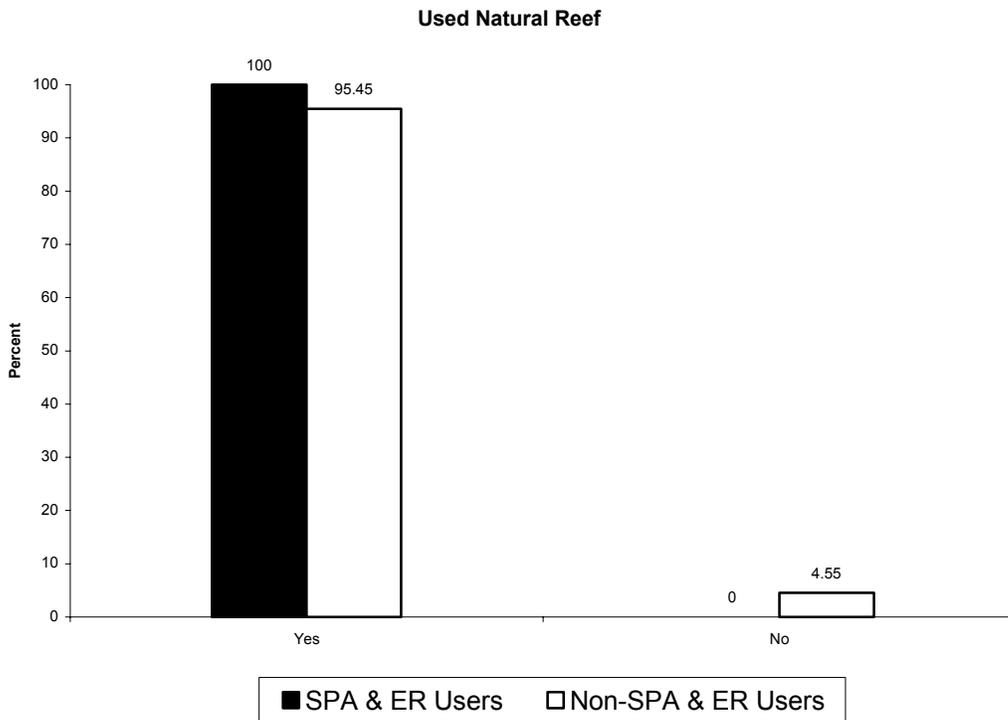


Figure B14. Monroe County Resident Profile: Natural Reef Usage, SPA & ER Users vs. Non Users

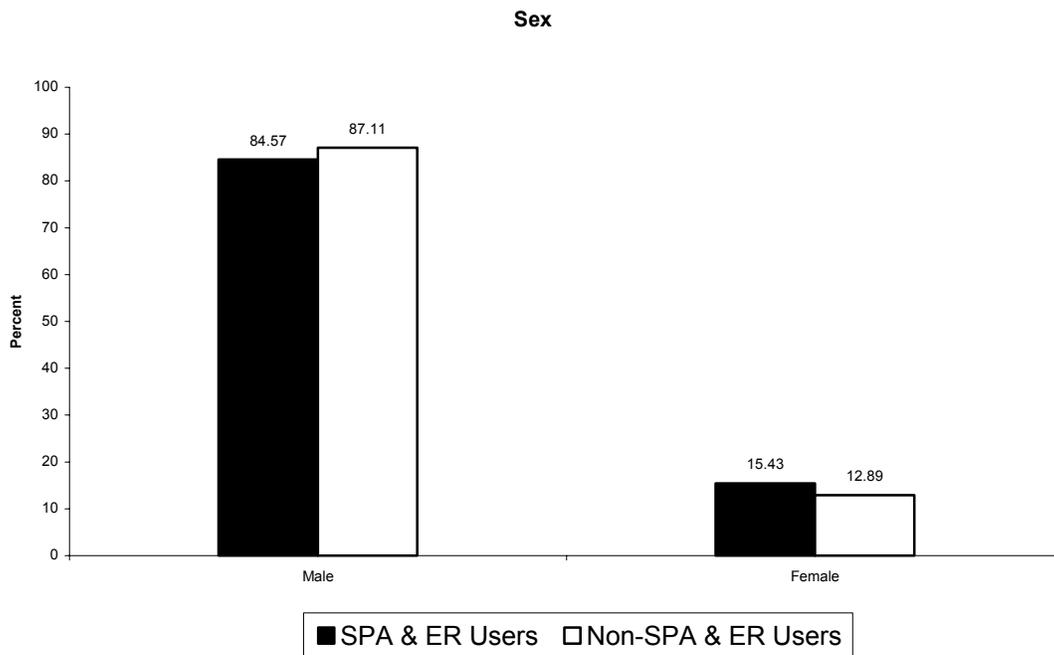


Figure B15. Monroe County Resident Profile: Distribution by Sex, SPA & ER Users vs. Non Users

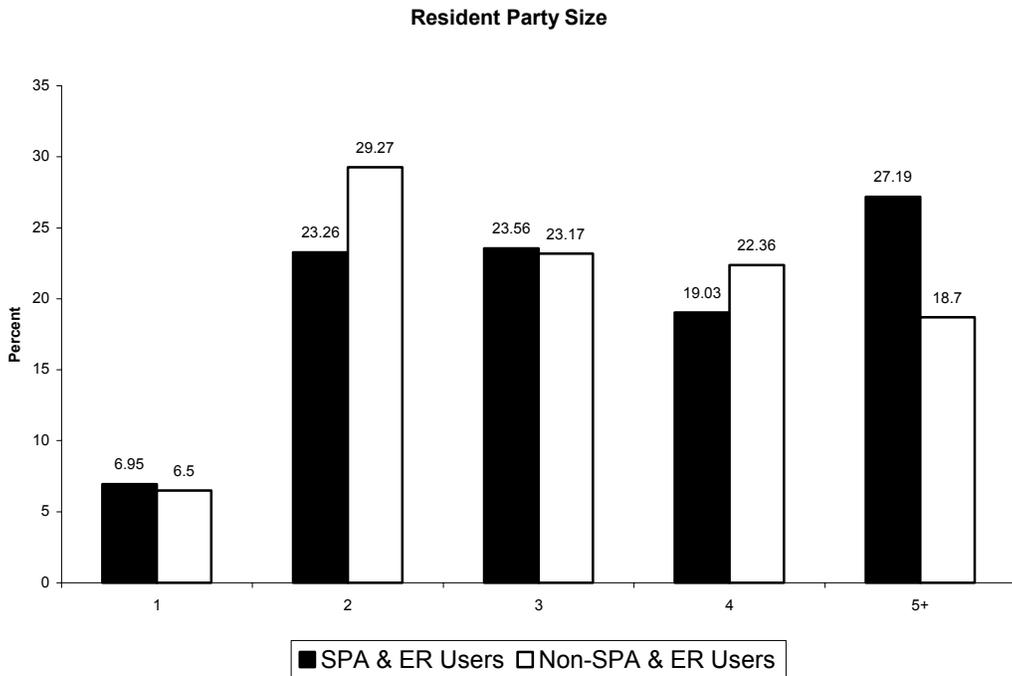


Figure B16. Monroe County Resident Profile: Party Size, SPA & ER Users vs. Non Users

Table B9. Monroe County Resident Profile: Boat Size (Square Feet)

	SPA & ER users	Non-SPA & ER users
Minimum	10	15
Maximum	58	52
Mean	23.83	23.56
Median	23.00	23.00
Mode	20.00	20.00

Table B10. Monroe County Resident Profile: Experience (Years Boating in South FL)

	SPA & ER users	Non-SPA & ER users
Minimum	1	1
Maximum	70	68
Mean	21.35	22.51
Median	20.00	20.00
Mode	20.00	30.00

Table B11. Monroe County Resident Profile: Number of Trips to Nat-Art Reefs

	SPA & ER users	Non-SPA & ER users
Minimum	0	0
Maximum	360	240
Mean	42.22	40.06
Median	25.00	20.00
Mode	40.00	20.00

Table B12. Monroe County Resident Profile: Number of Trips to Natural Reefs over last 12 months

	SPA & ER users	Non-SPA & ER users
Minimum	0	0
Maximum	180	200
Mean	27.16	30.28
Median	15.00	15.00
Mode	10.00	15.00

Table B13. Monroe County Resident Profile: Number of Trips to Artificial Reefs over last 12 months

	SPA & ER users	Non-SPA & ER users
Minimum	0	0
Maximum	375	120
Mean	16.32	9.65
Median	3.00	1.00
Mode	0.00	0.00

APPENDIX C

Table C1. Comparison of 2000-01 SPA & ER Users versus Non-SPA & ER Users:
Mean scores for Importance and Satisfaction

Item	Visitors		Residents	
	Importance	Satisfaction	Importance	Satisfaction
<i>Natural Resource Attributes</i>				
A. Clear Water (high visibility)	+●	+●	+●	+
B. Amount of living coral on reefs	+	+	+●	-
C. Many different kinds of fish and sealife to view	+●	+●	+●	-
D. Many different kinds of fish and sealife to catch	-●	+	-	-●
E. Opportunity to view large wildlife (manatees, whales, dolphins, sea turtles)	-	+	+●	-
F. Large number of fish	-	+●	+●	-
G. Quality at beaches	-	+●	+●	-
<i>Natural Resource Facilities</i>				
H. Parks and specially protected areas	+●	+●	+●	+
I. Shoreline access	-	+	+	-
J. Designated swimming beach areas	-	+	+	-
K. Mooring buoys near coral reefs	+●	+	+●	+
L. Marina facilities	-●	+	+	+
M. Boat ramps/launching facilities	-	-	-	-
<i>Other Facilities</i>				
N. Historic preservation	-	-	+●	+
O. Parking	-	+●	+	-●
P. Public Transportation	-	+	+	-
Q. Directional signs, street signs, mile markers	-	+	+	-
R. Condition of hike paths and sidewalks/walking paths	-	+●	+	+
S. Condition of roads and streets	+	+●	-	-
T. Availability of public restrooms	-	+●	+	+
U. Cleanliness of streets and sidewalks	-	+●	-	-

Table C1. (continued)

	Visitors		Residents	
	Importance	Satisfaction	Importance	Satisfaction
V. Uncrowded conditions	-	+	+	-
<i>Services</i>				
W. Maps, brochures, and other tourist information	-	-	+	+
X. Service and friendliness of people	-	+	+	-
Y. Value for price	-●	+●	+	+

- = statistically significant difference in mean scores at 0.05 or lower level of significance
- + = higher mean score, not statistically significant
- = lower mean score, not statistically significant
- +● = higher mean score and statistically significant at 0.05 or lower
- = lower mean score and statistically significant at 0.05 or lower